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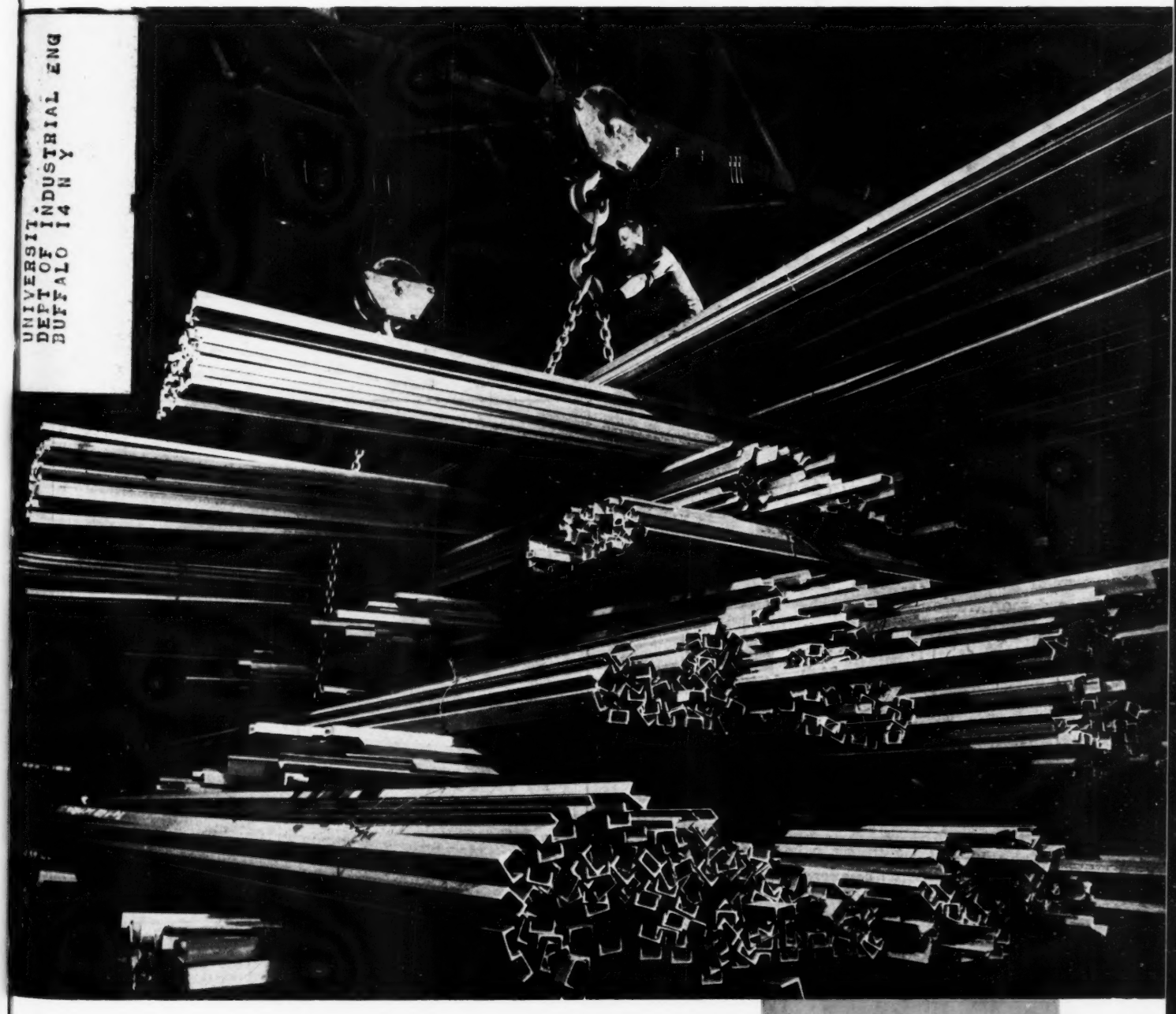

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Shooting a low-cost film documentary . . . page 22
Mirror photography saves setups . . . page 24
Cameras check rifle-fire accuracy for Army . . . page 28

FEBRUARY
1958

LIKE MAGIC! ...you make your own etched, anodized metal—

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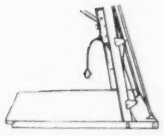

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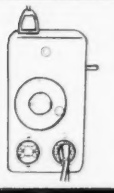

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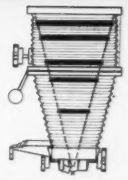

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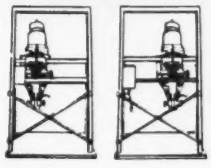

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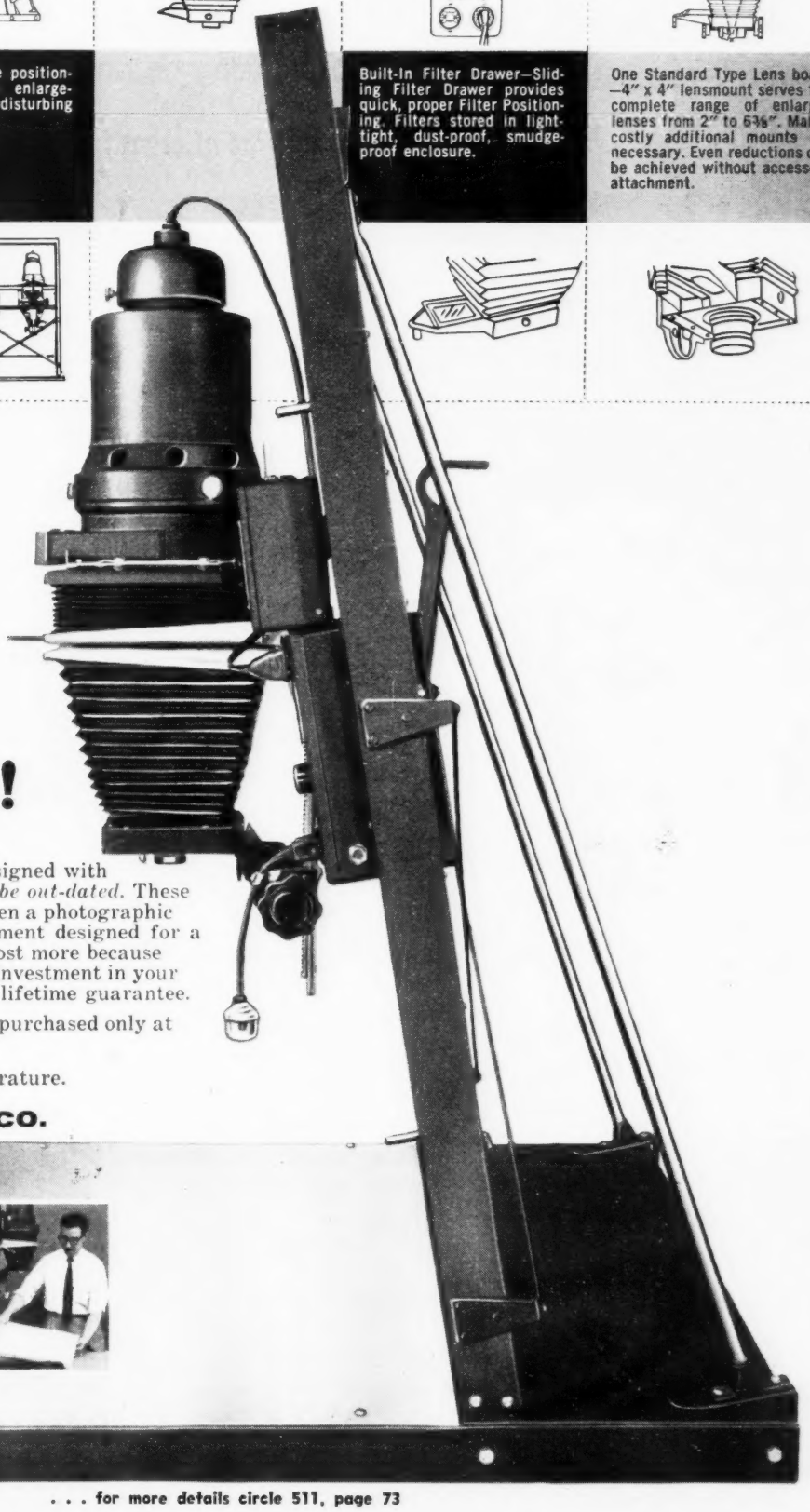

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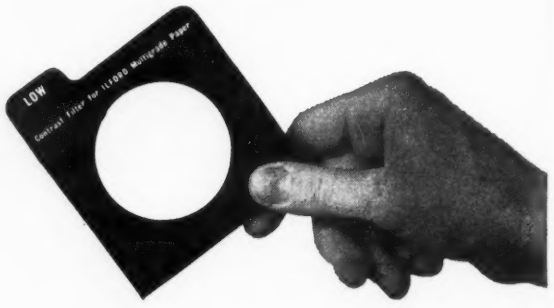

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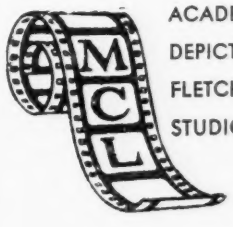

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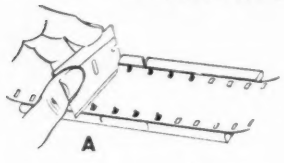
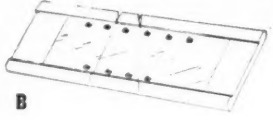


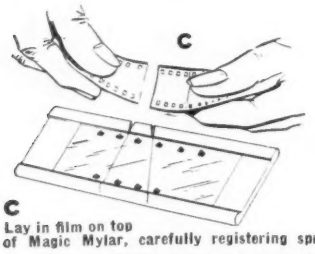
A

A
Register film on guide sprockets. Cut with angled razor blade.

B
Remove film, lay in Magic Mylar, sticky side up.



B



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Editor's Mail

Secret Formulae?

I should like to add a note to Mr. Varden's comments in his answer to the letter of Ivan H. Smith [see page 4, November, 1957] who asked for processing formulae for Ektachrome and Anscochrome.

The erroneous impression should not be given that Eastman and Ansco have not published these formulae because they are secret, or because these manufacturers are also in the chemical business and want to sell mixed chemicals. The fact is that both of these manufacturers have one prime motive: they want the users of their color films to get as good results as it is possible to get. One way to help insure this success is to ensure the user that the processing ingredients are properly and accurately measured.

Publication of formulae has been often considered by both manufacturers, but the critical accuracy which color processing requires is usually beyond the facility of the average photographer—or so the manufacturers feel. When you consider that some of the Ansco solutions, for example, call for a precise measurement of but a few milligrams of a chemical which must be fresh and properly stored, you will see that the manufacturer does not want to add another margin for error in the already delicately sensitive field of color photography.

Mr. Smith would be better off, perhaps, to improve his logistics. If his local supplier can not help or will not supply his needs, a letter to either manufacturer will help to direct him to a more dependable source. — David B. Eisendrath, Jr., N. Y., N. Y.

Seeks Template Equipment

Our organization is in the market for process equipment capable of producing templates. At the present time our thoughts are leaning toward the glass negative method rather than the contact method, so we thought, with your expert knowledge of this subject, you may be able to supply us with organizations who specialize in sale of such equipment.—Les Campbell, Purchasing Agent, Thieblot Aircraft Co., Div. of Vitro Corp. of America, Martinsburg, West Virginia.

Template - processing equipment using glass negatives is manufactured by the Ampower Corp. 50 Broad St., New York 4, N. Y.

Back Issue Wanted

We just started receiving INDUSTRIAL PHOTOGRAPHY and would like to have the October 1956 issue with the Color Directory. I live in a town of 80,000 and can get valuable information on color only from directories of this sort.—E. H. Wilt, Altoona, Pa.

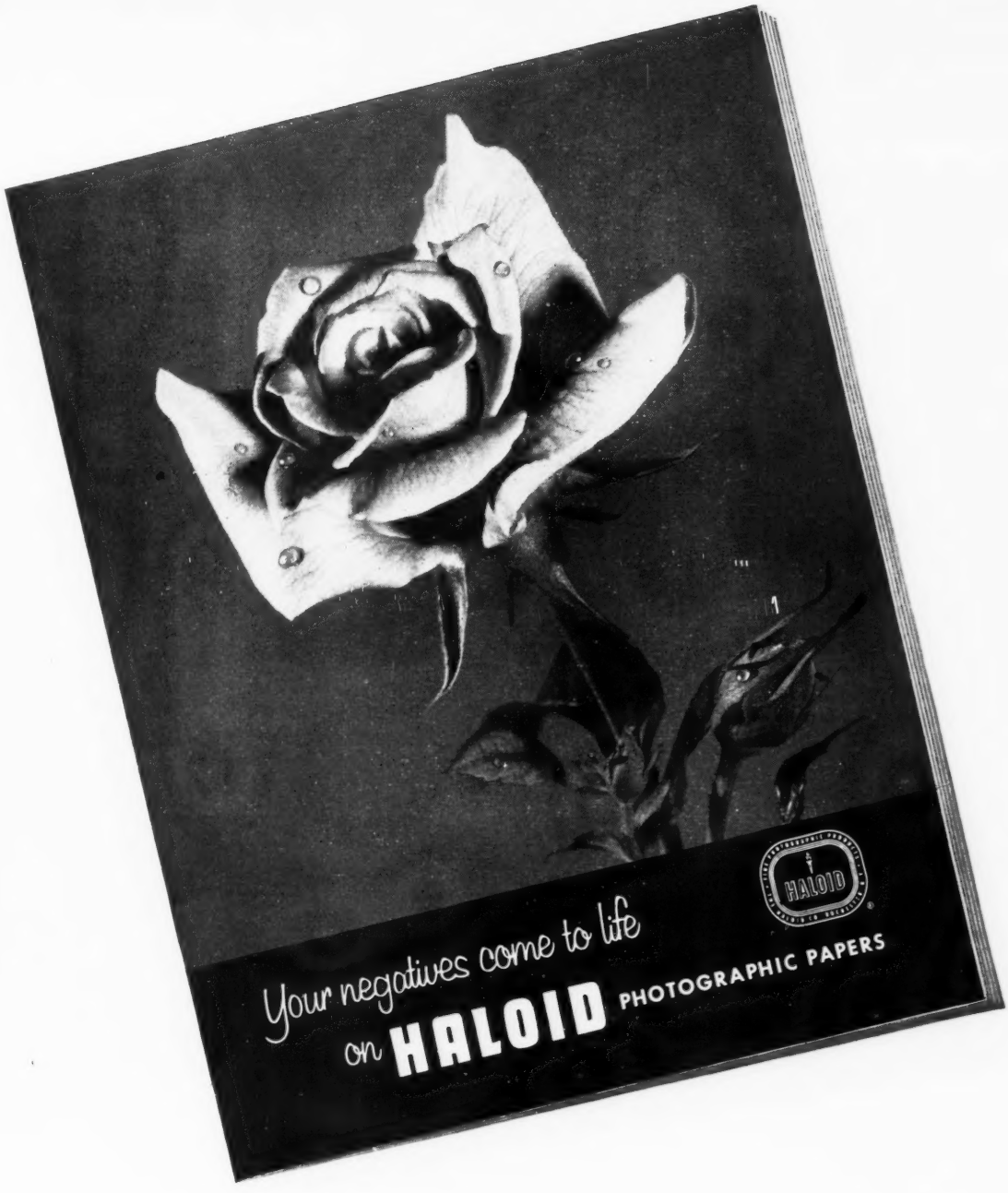
INDUSTRIAL PHOTOGRAPHY'S 1957 **author-subject index is now ready and will be made available without charge to those writing in on their companies' letterhead.**

Emulsion Wanted

As a part of our production processes, we must produce an emulsion on glass for reproduction of black and white line work. The speed need not be much more than Eastman high-resolution plates and the grain structure can be somewhat coarser. As this is part of an operation in our plant, we cannot have these plates coated on the outside. We intend to set up a complete department with emulsion-making and coating equipment. We would appreciate any findings that you may offer.—Nathan Pritikin, Glass Products Co., Santa Barbara, Calif.

David B. Eisendrath, Jr., Technical Editor, reports that Industrial Photo Products Co., 86 Worth St., New York has a direct positive emulsion which might suit the purpose. Also that Circular 565, National Bureau of Standards, describes techniques for ruling scales and etching them in glass, and also

continued on page 9



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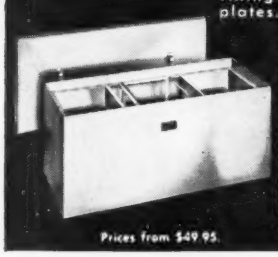

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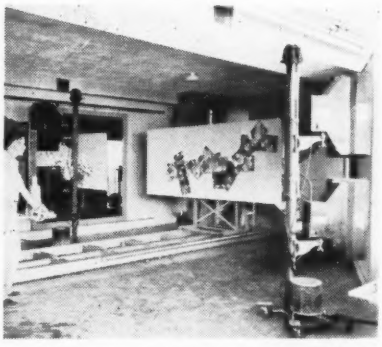

Since our firm is engaged in aerial photography and photogrammetric mapping, we regularly copy material up to ten feet in length. Spotting the arc lights off the ends of the copy board would require a good deal of space and would mean setting the bed of our 40x40 copy camera in the center of the room. To avoid this we installed an 80x80" plate glass mirror on rails along one wall of the room and set up one set of lights facing into it. The mirror "folds" the light rays, reflecting them onto the copy. The loss of reflected light, in practice, is negligible, and the system saves us space by allowing us to set up our camera closer to the wall.—*Peter E. Warneck, Sargent-Webster-Crenshaw & Folley, Watertown, New York.*

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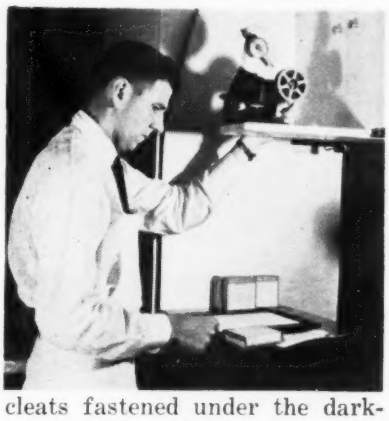

cleats fastened under the darkroom shelf.—*James Hampson, Arkansas Fuel Oil Co., Shreveport, Louisiana.*

Improvised Funnel

Snipping off a bottom corner of the plastic bag in which cut

film is packed turns it into an improvised funnel.—*Bil Toman, Palatine, Illinois.*

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INSTRUMENTATION CAMERA TYPE T232 Mk7

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Power:	28 volts DC, constant demand, .4 amperes; intermittent up to 1.8 amperes. The Type T232 DC power supply, which operates from 110v 60 cps, is available to power the camera
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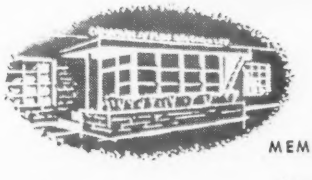

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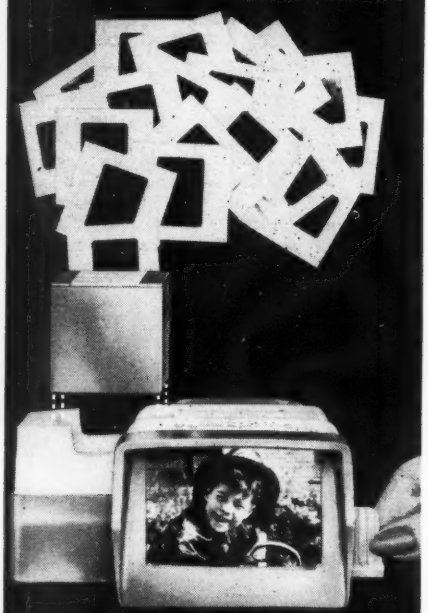
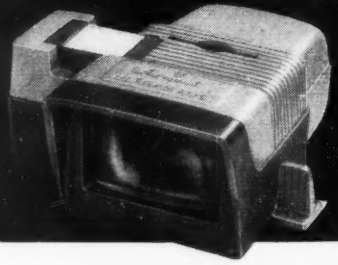


magazine-load slide viewer shows slides Big, Bright, and automatically



So simple it's almost unbelievable . . . just place your cardboard slides in the magazine . . . slip the magazine into the ULTRAMATIC. See your color slides enlarged 7x! Watch slides feed into the viewer and back into the magazine with fingertip action. Additional indexed magazines store and protect all your slides! $14.95 less batteries; AC model $18.95 with brightness control.

Dept. 1-2

AQ36

AIREQUIPT MFG. CO., INC.,

. . . for more details circle 501, page 73

Association News

SMPTE Convention

Plans are being completed for the *Society of Motion Picture and Television Engineers* Convention at the Ambassador Hotel, Los Angeles, April 21-25. The Society plans to stage a comprehensive exhibit of the latest industry equipment developments as a highlight of the convention.

Papers are being compiled on closed-circuit television, high-speed and instrumentation photography, sound recording, laboratory practices and other current industry topics.

SPSE Sets 1958 Meeting

The *Society of Photographic Scientists and Engineers* will hold its 1958 annual meeting at the Manger Hotel, Rochester, N. Y., October 6-10. Information on the meeting can be obtained from Ira R. Kohlman, newly appointed Conference Coordinator of the Society, at 533 West 57 St., New York 19, N. Y.

First Annual IVC Congress

About 2,000 visual communication experts recently attended the first annual International Visual Communications Congress sponsored by the *Society of Reproduction Engineers* in Chicago. Highlighting the meeting was an exhibit of multiple copying equipment and machinery valued at more than one million dollars.

"Life" Staffer at IPAM

Frank Scherschel, "Life" staff photographer, was the guest speaker at the annual banquet of the *Industrial Photographers Association of Michigan* in Detroit last month. More than 200 people attended.

OHIO VALLEY PHOTOGRAPHERS INSTALL NEW OFFICERS

Officers for the *Ohio Valley Industrial Photographers' Association,* now in its first full season of technical meetings, have been named. Cameron Heverly, Procter & Gamble Co., is the new secretary-treasurer. Other officers are: Richard A. Willson, General Electric, chairman; Frank Lukas, Crosley, vice-chairman; Howard Hood, General Electric, program chairman; Joe Deifel, General Electric, membership chairman.

New OVIPA officers are (l to r): Cameron Heverly, Secretary-Treasurer; Richard A. Willson, Chairman; Frank Lukas, Vice Chairman. (Second row): Howard L. Hood, Program Chairman; Joe Deifel, Membership Chairman.

EDITOR'S MAIL

continued from page 4

reproducing them by means of a formaldehyde light-sensitive resist. Circular is from Supt. of Documents, Washington 25, D. C., 30 cents.

Hydrogen Peroxide Exposures

Some time ago I read a piece in *Coronet* magazine relative to the fact that a fern leaf bound onto a photo plate for a few days left an image which showed up after development.

It has been suggested that I contact INDUSTRIAL PHOTOGRAPHY to determine how this was done so that I could duplicate some of this work.—Gaston Burridge, Downey, Calif.

The phenomenon cited was first observed by R. Colson and W. J. Russell back in the 1890's. A complete description of their observations can be found in the book entitled, "Physical Physics," by S. W. Tromp, Elsevier Publishing Co., 1949.

It has been found that when metals, pieces of freshly-cut foliage, etc., are placed close to photographic emulsions for a number of hours, the emulsion showed upon development the surface structural details of the object. It is now well known that the cause of the image produced on an emulsion arises from traces of hydrogen peroxide rather than any mysterious "radiations." Freshly cut metals, trees, etc., produce and radiate hydrogen peroxides when their oxides are formed in contact with the air.

Since hydrogen peroxide is a strong fogging agent for photo emulsions, its diffusion from the object's surfaces can easily create the photographic image. —L. E. V.

Booklet Wanted

On page 34 of the December 1957 issue you mentioned "Technical Information on Color" prepared by the Color Corporation of America. How can we obtain a copy? — Charles Eyer, Courtaulds, Inc., Mobile, Ala.

Write, Color Corporation of America, 43 W. 61st St., New York, N. Y.

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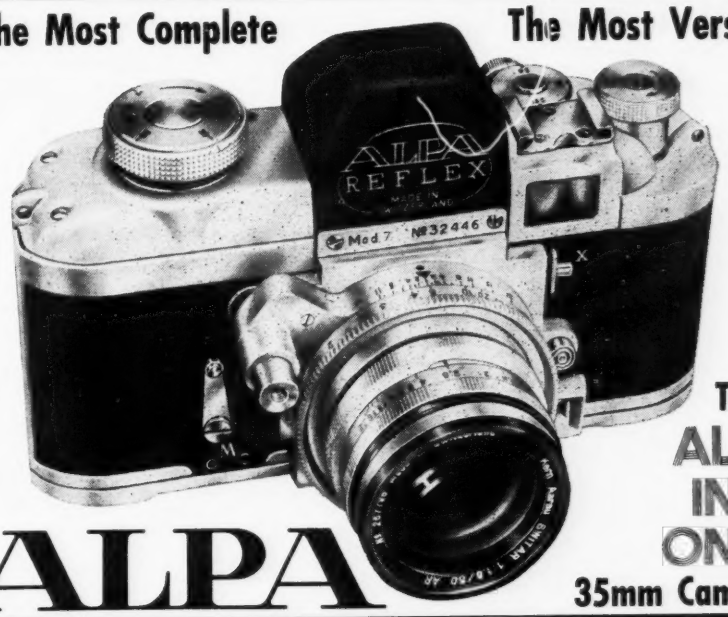
The Most Complete **The Most Versatile**



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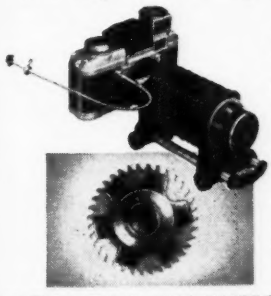
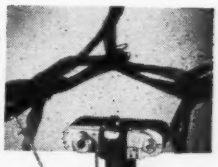
The ALL IN ONE 35mm Camera

Through-the-lens focusing and precision-ground reflex prism with convenient 45° viewing angle give razorsharp, reinverted "Lifesize" image of unsurpassed brilliance . . . **with any lens, at any distance, for any magnification—no parallax ever!**

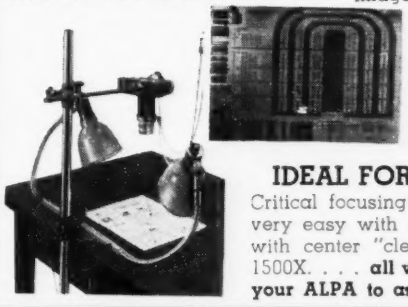


IDEAL FOR CLOSE-UPS



Continuous focusing range from infinity down to ultra close-ups enables you to take Macro-Photographs of any small parts, crystals, textile samples, test sections, scientific subjects or specimens, etc. . . . **all with critical definition and highest contrast.**

IDEAL FOR COPY WORK



Accurate framing of groundglass image provides utmost ease of focusing and composition —for exacting, undistorted reproduction of blue prints, charts, maps, bookpages, meter dials, etc. . . . **all with predetermined magnification.**

IDEAL FOR MICROSCOPIC PHOTOGRAPHY

Critical focusing on your micro-slide preparations is made very easy with ALPA's finest grain groundglass, available with center "clearspot" for high power microscopy up to 1500X. . . . **all with ONE single adapter-ring which attaches your ALPA to any microscope.**

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You always see exactly what you get with the parallax-free, single-lens reflex system of your ALPA: You cover extreme wide angles for production lines or entire buildings, you take portraits for badges and personnel cards, you snap group and interior pictures at medium range, you close in on any far distant subject or view—**all with your ONE ALPA and its top quality lenses (28mm wide angle up to 3750mm supertelephoto)—each unconditionally guaranteed for highest optical performance.**

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ALPA 6 (prism reflex w/built-in rangefinder) or ALPA 7 (prism reflex and separate rangefinder) w/ALPA-XENON 50mm f/1.9 Preset Diaphragm ---------- $379.00
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. . . for more details circle 547, page 73

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on all types of paper

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Try it . . . you'll like the difference!

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1770 W. Berteau Ave., Chicago 13, Illinois

. . . for more details circle 573, page 73

New Equipment and Materials

Keep posted on the latest developments in the photographic field. Each new product and supply item featured below has a key number. If you want more information on the subject — without any obligation — circle that same number on the Readers Inquiry Card on Page 73.

Sharpshooter Camera **101**

Miller-Trojan Co. announces the Sharpshooter copy camera. Of new design, it features a 10¾" Wollensak Raptar lens, hand calibrated stainless steel focusing scales, monorail track and an automatic timer which controls exposing lights and solenoid operated shutter. Included are copy board and four 300W lamps. The camera is 71½" long and weighs about 150 lbs. Price: $795.00.

Printmaster 1000 **102**

A new whiteprint machine for high volume production is being marketed by *Ozalid.* The unit accommodates materials to 54" wide at speeds to 100FPM. It is 66" high, 78" wide and 55" deep and is wired for 220V, AC, 60 cycle, single phase. A self-encased roll holder will hold up to 200 yards of sensitized materials.

"Expert" View Camera **103**

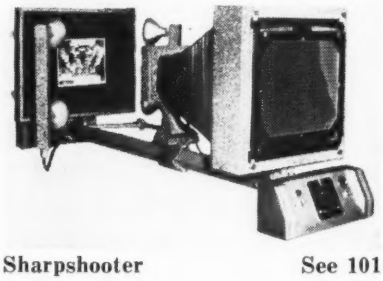
Karl Heitz, Inc. has announced the Sinar Expert 8 x 10 Interchangeable View Camera, incorporating built-in registration pins, multicolor plate holders, special wide-angle bellows which doubles as a viewing and focusing hood. The non-vignetting 26" bellows can be supplemented with an extension for telephoto lenses of unlimited focal lengths. Convertible to 5 x 7 and 4 x 5, the new model weighs only 17 lbs. and is built of lightweight metals. Price: $929.

Test Multimeters **104**

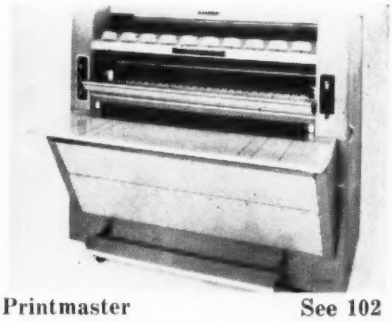
Hycon Mfg. Co. is marketing its 1958 line of rack-mounted digital multimeters which can be used in photo-study circuitries measuring pressure, temperature, velocities, resistance, current or voltage. Model 615AR is a general purpose volt-ohmmeter while the Model 645AR is a high precision model for high-accuracy.

Listomatic Camera **105**

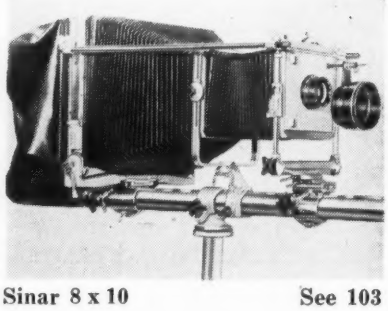
The Listomatic Camera which photographs tabulating cards in column listings on film is announced by *Recordak.* To produce column negatives, the camera photographs the cards at a speed of 230 per minute. Once processed, the film becomes the offset or letterpress negative, ready for stripping into page makeups. With varying column width film sizes to 7" available, the unit accommodates 400-foot film rolls.



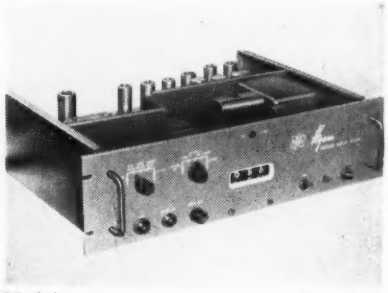
Sharpshooter See 101



Printmaster See 102

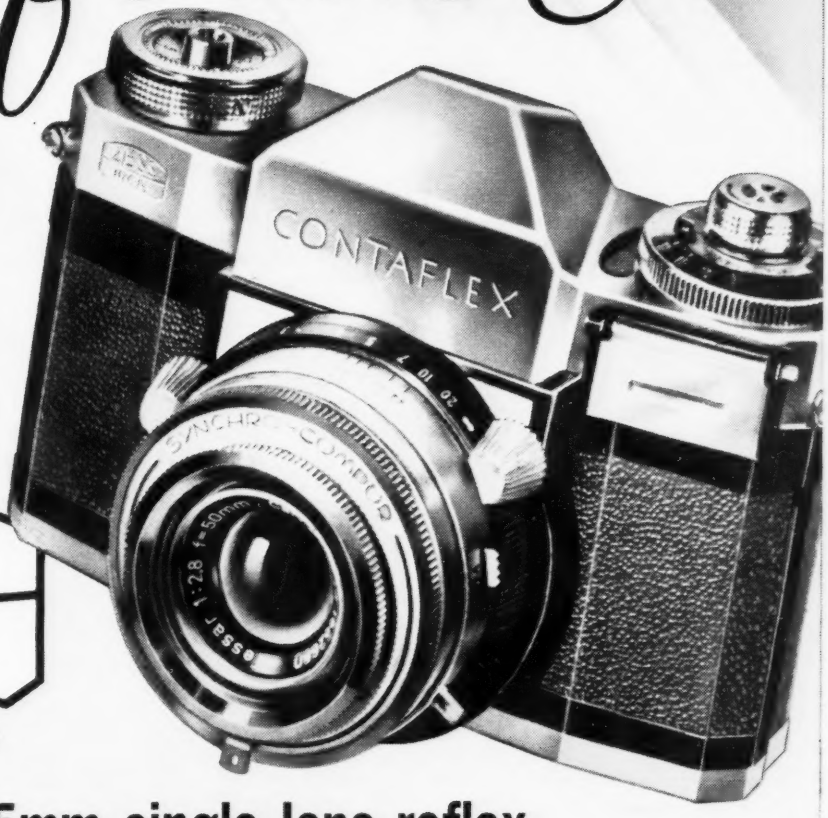


Sinar 8 x 10 See 103



Multimeters See 104

Outstanding performer



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Contaflex booklet on request.

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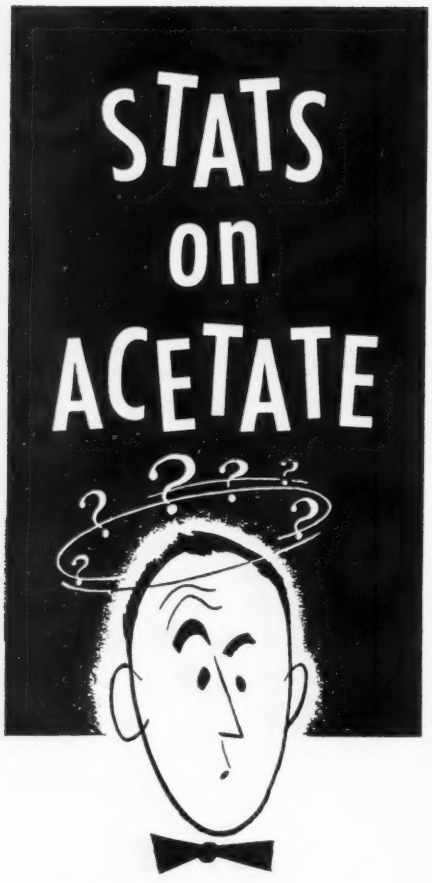

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Black on clear acetate 11 x 14	$2.00
White	5.00
ANY Color	7.00

Add negative charge of $1.00 per sq. ft. to all orders. Acetate is .005 thick . . . available up to 20 x 24 and there's no charge for opaquing paste-marks or positioning.

How to order . . .

Line copy (any size) plus a tissue tracing, showing: Focus . . . Color sample (when necessary) . . . Position of copy on acetate . . . Outside dimensions of acetate.

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. . . for more details circle 510, page 73

Time Lapse Drive **106**

Electro-Mechanical Development Co. announces the model 1325 time-lapse drive train for Cine Special I and II motion picture cameras. It permits, for example, taking a picture once each minute for a period of 40 minutes and then projecting it at the rate of 16 FPS to compress 40 minutes of action into 2½ sec. A Veeder-Root footage counter, pilot lamp and fuses are provided. It operates at 77W on 120V, AC, 60 cycles. It weighs 8 lbs. and is 11⅛ x 8½ x 5". The unit is housed in a steel case. List price is $395.

Micromatic Microfilming **107**

Ozalid is marketing Micromatic, a combination microfilm reader, enlarger and developer that selectively reproduces a paper print from negatives in about one minute. The viewing screen is 24 x 36", while magnification for viewing is 20X and 15X for enlarging. The developing section is removable for cleaning and replenishing. Light source is a 500W air-cooled lamp. The unit weighs 700 lbs., is 65" high, 40" wide and 42" deep. It operates on 110V, AC, 60 cycles.

TEL-Animaprint **108**

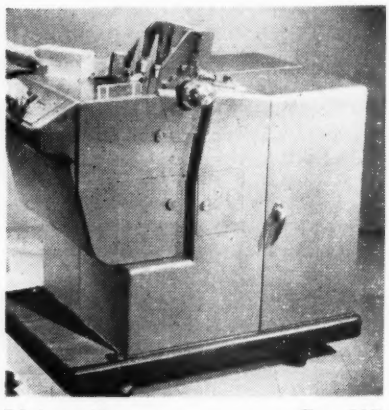
An electronically controlled hot-press printer is being marketed by *S. O. S. Cinema Supply Corp.* to speed production of titles, crawls, flip cards and ad copy. Featured is an automatic temperature control system which controls heat to ± 1°F. Complete with a 9" self-centering typeholder, calibrated linefinder, and anodized animation lineboard, the Electronic TEL-Animaprint lists at $495. A conversion kit to adapt previous models to the new control system is available at $149.50.

Special Cine Drive **109**

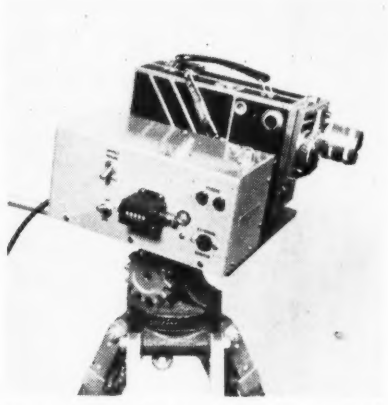
Lafayette Instrument Co. has developed a special cine drive for the Kodak Cine Special, Bolex H-16, and Bell and Howell motion picture cameras. The drive permits speeds of one frame per 2, 5, 10, 30, 60, 120, 180, 240 and 300 seconds. These speeds are available with the drive attachment for the standard Lafayette drive. The combined drive unit is $480. Also available is a three speed drive unit at $160.

Arri 1000 Blimp **110**

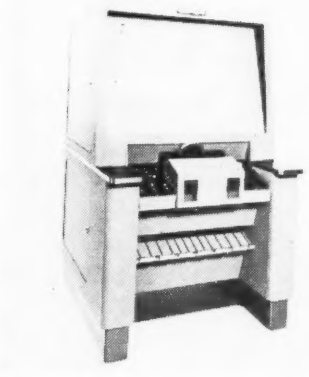
Kling Photo Corp. has announced the addition of the Arri 35 1000-foot blimp to the Arriflex 35 line. The blimp is designed to accept the 1000-foot Mitchell magazines without any modification. A special



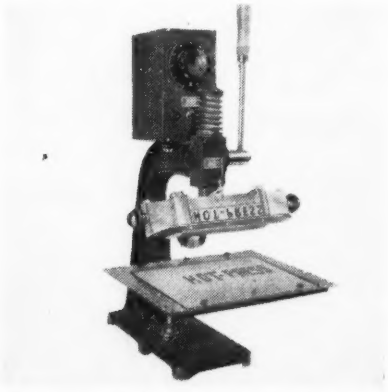
Listomatic See 105



Time Lapse Drive See 106



Micromatic See 107



Hot-press Printer See 108

GEVAERT MAKES QUALITY LOOK EASY...

And with Gevaert, quality comes easy, too. Time, temperature, developer—lots of things can go wrong. So it makes big sense to use the film with man-size *forgiveness* . . . GEVAERT.

You'll get a lot more, too. Wiry detail, hard clean dots on a rugged film that dries fast and flat. Plenty of room to juggle in developing. No halos, and fog stays down even when this film is forced.

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LITHOLINE O 82p FILM – maximum contrast, highest sensitivity, latitude and resolving power. Polystyrene base for utmost stability.

O 81 LITHOLINE ORTHO – 0.003″ thick; thin base for line or screen positives or negatives.

O 82 in regular base, same emulsion – 0.006″ thick.

P 23 FILM – a fast panchromatic emulsion. Long gradation, high resolving power, wide latitude in exposure and development. Ideal in color separation work.

GRAPHIC P 2 PLATE – for making separation negatives from color transparencies or copy. Same photographic characteristics as P 23 film.

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345 Adelaide St., West, Toronto 2-B, Ontario

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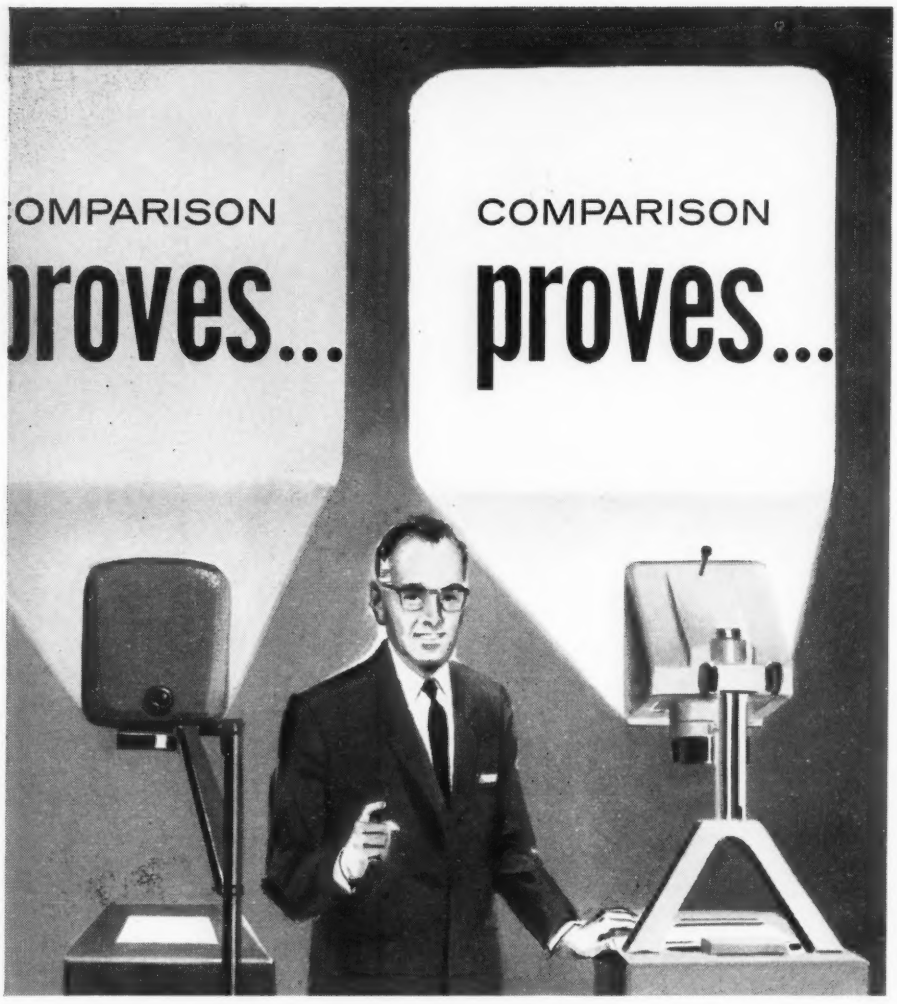
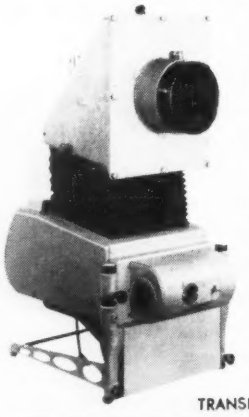


transpaque

PUTS MORE LIGHT ON YOUR SCREEN!

Compare the Transpaque side by side with any other projector on the market. Project the same picture size with each . . . with the same materials, opaque or transparent. You'll find the new Transpaque puts up to *twice the light on the screen* with opaque materials . . . up to *three times* with transparencies.



This means you can use the Transpaque from the front or back of the room, *and even for rear projection*, without putting out lights or drawing shades. Selection of projection lenses from 4″ to 40″ focal length permits you to use *any* screen at *any* distance.

You can purchase the Transpaque complete for opaque, table, or overhead projection. Or, you can purchase this unit for one type of projection now and add equipment for other uses later. See it demonstrated in comparison with others and you'll be convinced that this is truly the aristocrat of visual communication projectors. Write us to arrange a demonstration for you.

TRANSPAQUE OPAQUE PROJECTOR

PROJECTION OPTICS

PROJECTION OPTICS CO., INC. 330 Lyell Ave., Rochester 6, N. Y.

. . . for more details circle 574, page 73

adaptor is provided. An extra large rectangular front port with an optical glass window and two filter stages for standard 3 x 3″ glass filters are provided. Also included are two observation windows and a tachometer. The complete blimp with all accessories is $3995.

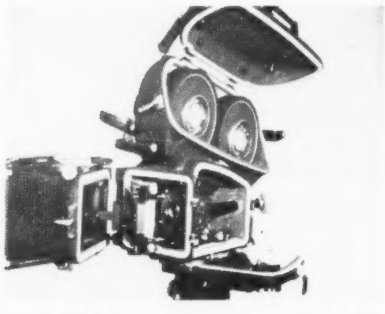
New Miniature Flashbulbs 111

General Electric Lamp Division announces a miniature photo flashbulb said to offer complete large bulb performance. PowerMite M5, the new, zirconium-filled bulb, has the same picture taking qualities as the larger GE No. 5 bulb and can be used with the same cameras. Its light output is 16,000 lumen seconds. Available about March 1, the bulb is priced at 14c.

INDUSTRIAL PHOTOGRAPHY'S 1957 Index is now available.

Art Projector 112

J. A. Engel, Inc. is marketing its Model 44 Art-O-Graph artwork projector which casts and enlarges to four times the images of photos, originals or artwork onto a drawing board. It also will reduce 4X. The unit mounts vertically on the wall, with controls mounted under a bench.



Arri 1000 See 110

PowerMite See 111

R-15 Processor **113**

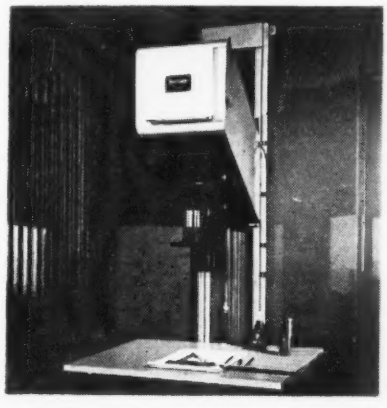
Filmline Corp. announces its model R-15, 16mm combination reversal and negative-positive processor. A friction type over-drive film transport system moves the film at speeds from 300 to 1200 feet per hour with developing times ranging from 1½ to 12 minutes.

Heliarc welding and stainless steel, precision ball bearings and a time-delay feed-in elevator are part of the construction features. The drybox uses a forced warm-air principle to dry to exact humidity content. Plumbing is all self-contained and the unit operates on single-phase 110-115V, 20 amp., 60 cycles. It is 50" high, 6' 5" long, 24" wide and weighs 475 lbs. A 400-foot leader is encased in 10 sections holding 41½ gallons of solutions.

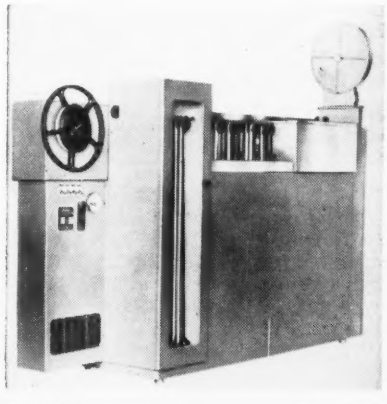
70mm Statfile Recorder **114**

Photostat Corp. has announced the 70mm Statfile Recorder which combines a microfilm camera and projector for recording, storing and projecting large documents up to 3⅓ x 5 feet. The 3 x 4-inch film copies are said to be large enough so that all details can be seen with the naked eye, yet can be stored in small files.

continued on page 46



Art Projector See 112



R-15 Processor See 113

To improve production and lower costs

studios all over America are installing Calumet's Nitrogen Burst equipment . . . the ingenious system that *automatically agitates* the processing solution with intermittent bursts of safe, inexpensive nitrogen gas. Time and labor saved . . . negatives come out *uniform*. WRITE for NITROGEN BURST FOLDER that tells how it works.

today's photographer needs

expert, scientific guidance in planning his new darkroom, or modernizing his present one. Calumet's "NEW LIGHT ON DARKROOMS" is a step-by-step fully illustrated manual to help you blueprint a darkroom for your own needs. Now in its 4th edition! Send for your FREE COPY.

the best processing, laboratory and studio equipment and cameras

for industrial and professional use come from Calumet, we believe. Only durable, non-corrosive type 316 stainless steel is used in fabricating Calumet equipment. More than 1000 of these items are sold to you DIRECT in the CALUMET CATALOG . . . sent promptly on request.

to meet all industry's demands

Calumet's all metal VIEW CAMERAS are rigidly constructed for all-round work. Flexible swings and slides enable you to control distortion. Lightweight, portable, they are invaluable for studio and on location. WRITE FOR BOOKLETS on the CALUMET 4 x 5 and 8 x 10 VIEW CAMERAS.

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Manufacturers of Cameras, Photographic Processing, Studio and Laboratory Equipment

. . . for more details circle 519, page 73

choose and use interchangeable lenses faster and more effectively

NIKON SP

with Built-in Universal Viewfinder System

The Nikon SP is the first rangefinder-coupled '35' to realize the full potential of interchangeable lenses. Built right into the SP is the Universal Viewfinder System, which provides the correct viewing fields for six different focal lengths – from 28mm wide angle through 135mm telephoto.

YOU CAN CHOOSE THE LENS FASTER. Without removing a lens from the camera, you can preview the scene, and pre-determine which of six focal lengths will give the framing you want.

YOU CAN USE THE LENS FASTER. Once you've selected the lens to use, you can bring it into play faster, since no accessory finder is required. In conjunction with the Nikon quick-change bayonet mount, you can be ready to shoot in less than 10 seconds. Focusing and composing is faster, too, since there is no need to shift the eye to an auxiliary finder on top of the camera.

This unique viewfinder system brings to interchangeable lens work, all the handling ease and speed that has become traditional with Nikon. And with a new SP you can call on the unique, rapid-fire Electric Motor Drive for automatic or sequence work – on a selection of 16 different high-speed, high-resolution Nikkor lenses – plus accessories for special adaptations, like the Nikon close-up attachments, Microflex, Copy Outfits, and many others.

Nikon SP with 50mm Nikkor f/2 $369.50;
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NIPPON KOGAKU TOKYO

A copy of the fully illustrated SP brochure is available at your Nikon-franchised dealer, or by writing to Nikon Incorporated, Department IP-2, 251 Fourth Avenue, New York 10, New York. *In Canada:* Anglophoto, Limited, 880 Champagneur Avenue, Montreal.

. . . for more details circle 568, page 73

Industrial Photography

VOL. 7, NO. 2, FEBRUARY, 1958

EDITORIAL

OVERSEAS CIRCULATION

Arrangements are now being completed for increased circulation of INDUSTRIAL PHOTOGRAPHY to important areas in Europe, Asia and South America. We look forward to this opportunity to serve our new readers . . . and to the opportunity it gives us to participate in the exchanges of technical knowledge, that we all hope will make a more peaceful and prosperous world.

INDUSTRIAL PHOTOGRAPHY is not entirely unknown overseas. The mail we receive from foreign readers indicates that copies directed abroad are enthusiastically received, closely read and carefully passed along. It should please American industrial photographers to know in what high esteem they are held by their overseas colleagues and the widespread respect there is for the craft of functional photography.

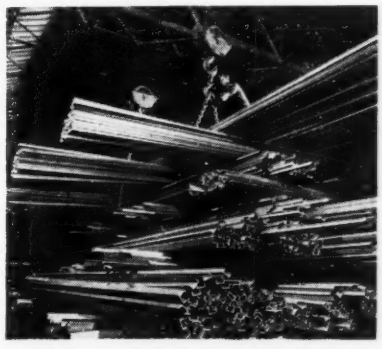
Copies of our magazines have been prominently displayed as part of American exhibits in industrial fairs sponsored abroad. Index requests from important state libraries in foreign capitals indicate that complete reference files of our issues are permanently retained.

There is, of course, general admiration of American technical and industrial know-how. However, if we are to keep the reputation we will have to deserve it by continued imaginative research into new tools and techniques.

Jim Watkins

Publisher

COVER PHOTO



The cover photo, taken in a British steel mill, is part of a comprehensive assignment for the British Iron and Steel Federation undertaken by Adolph Morath. He used a Linhof Super Technika 4x5, open flash with four synchronized flash bulbs, and an exposure of two to three seconds. For better composition, the photographer had a slag heap removed from the foreground and the crane positioned directly over the hindmost ingot. The conveyor system was purposely de-emphasized.

PHOTO CREDITS

Pages 18 and 19, Photographic Department, Advance Industries, Inc.; Pages 20 and 21, Sandia Corporation Photographic Laboratories; Pages 22 and 23, Photographic Staff, Public Relations Department, Hycon Manufacturing Co.; Pages 24 and 25, J. J. Barton, Staff Photographer, Franklin Institute Laboratories; Pages 26 and 27, Department of Information Services, Armstrong Cork Co.; Pages 28 and 29, U. S. Army Photos; Page 32, David L. Miller; Page 34, Photographic Department, West Penn Hospital; Page 36, Gruenwald's Specialized Equipment Service; Page 40, American Management Association; Page 42, Photographic Department, Willys Motors, Inc.; Page 69, Eastman Kodak Company.

by EARL P. PURPURA
Project Engineer
Advance Industries, Inc.

Printed circuits on irregular surfaces

In the design of control circuits for electronic equipment it is necessary to switch many voltages and signals simultaneously, each switching setting up a fixed combination of conditions between the variables. Multiple deck, multiple circuit switches are sometimes used for this purpose, but they are of involved design and difficult to obtain on short notice. In addition, there is no flexibility during development to add circuits to the switch as the design progresses.

A simple solution worked out at Advance Industries, Inc., is to use a printed circuit drum switch. The technique described here offers the advantage of versatility in that basic circuitry can be changed without rewiring. The drum shown on this page replaces an eight-position, six-deck wafer switch at about half volume and could easily have been made one-half its present size.

BASIC MATERIAL

The basic material used in this application is Plymaster—a one or two ounce sheet copper coated with uncured resin. Three grades of Plymaster are available—for the one- and two-step method of curing—and all lend themselves to this method.

The first step in printed circuitry is the design which is carefully laid out four times actual size. An outline of the circuit is drawn in India ink and then blocked in by black adhesive tape in overlapping layers. Each of the finished drawings is photographically reduced and film positives made by contact printing.

Probably the most crucial part of the operation is dependent upon the photographer inasmuch as mating of the edges of the laminate sheet depends on proper size retention. Electrical continuity was not necessary in the design shown here so that a gap at the mating edge of even 0.005 inch was permissible. However, the method outlined below provides for continuity around the drum.

COVER WITH SARAN WRAP

First, the Plymaster sheet is prepared by covering the resin with Saran wrap held down with a waterproof adhesive tape. The purpose is to prevent dyeing of resin as this may be objectionable if the drum is light in color. The copper is appropriately cleaned and dried, and finally coated with Kodak Photo Resist. Because the sheet is flexible, it is convenient to dip it into a tray of Resist and then set it onto a piece of corrugated cardboard to dry in the dark. If an oven is used to hasten the drying, temperatures should be held below 100°F.

The laminate and the positives are placed in a printing frame emulsion to emulsion, and exposed for an appropriate length of time. A commercial quartz lamp printer will yield results in one and one-half minutes, sunlight will require fifteen minutes. The exposed sheet is then developed and dyed as recommended.

To obtain a silver plated sheet the printed laminate sheet must be made chemically clean. Dips in caustic, acid, and water baths should prepare the copper for plating. All solutions may be warm, but not hot, as heat tends to set the resin. Plating need not be heavy, 0.0002 inch thick will offer enough resisting action during etching. Incidentally, silver was chosen for subsequent etching in ferric chloride; however, a lead-tin plate must be used when etching in chromic acid.

Lastly, the backing sheet is removed from the plated laminate and the dyed resist removed. The drum and the completed sheet are now prepared for baking under pressure.

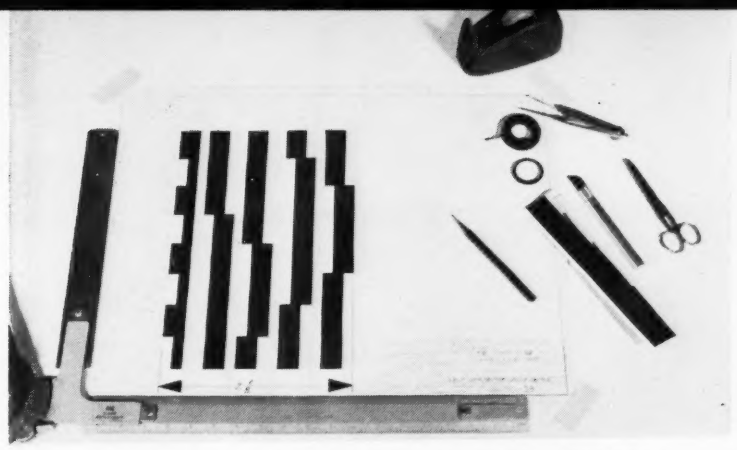
First, the mold is carefully cleaned and the drum and sheet washed in acetone. When they are assembled, the mating edges will fall along the dividing line of the mold. The left-hand piece of the mold is carefully placed over the right-hand section and the screw away from the laminate mating edge is taken up completely before the other is drawn tight. The assembled drum is set into a 300°F oven for thirty-five minutes to bake, removed, and allowed to cool.

DRUM IS CLEANED

When the mold is opened, the drum again is made chemically clean and then etched. Next, finger contacts are made on a sheet of epoxy glass cloth with two ounces of silver plated copper. The base material is thin to allow flexing for pressure contact when both drum and fingers are finally assembled.

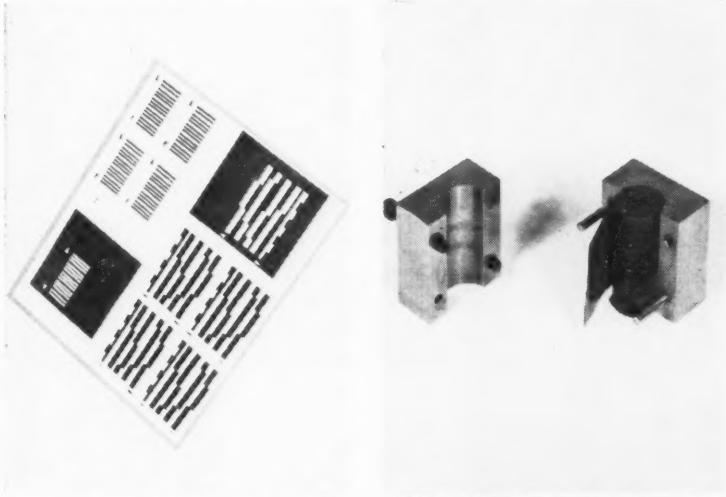
The bearing surfaces have a marked effect on one another and final application dictates the selection of materials. In some cases a relay finger may be used for contact and in other cases a graphite brush which will allow many operations without

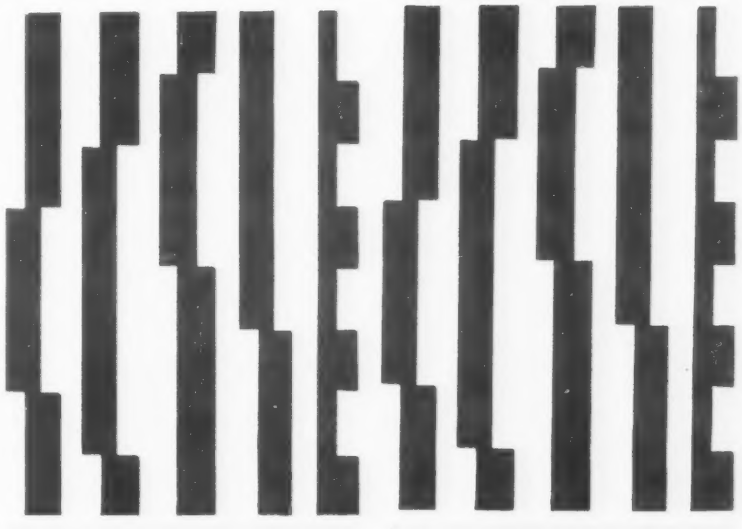
Expert outlines a simple photographic technique for making circuits enabling simultaneous switching of many voltages and signals.

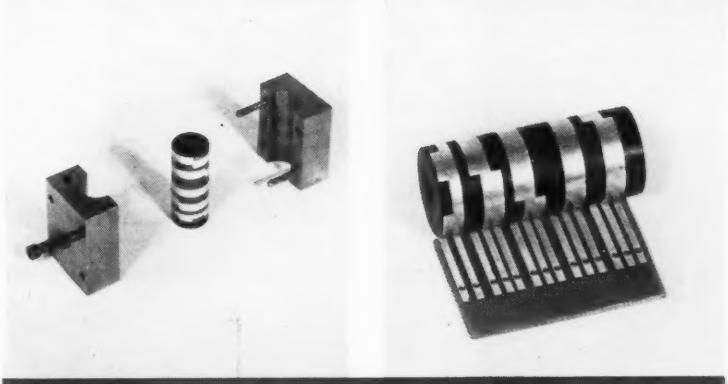


Printed circuit design is laid out four times actual size. The drawing is outlined in India ink and blocked in with tape.

Photo, left, shows to size negatives and positives of original design. On right, drum and sheet are inserted into the mold.







appreciable wear on the drum circuit.

Lastly, if continuity is desired around the drum, i.e., no break at the mating edges of the circuitry, it is possible to reduce silver onto the drum surface.

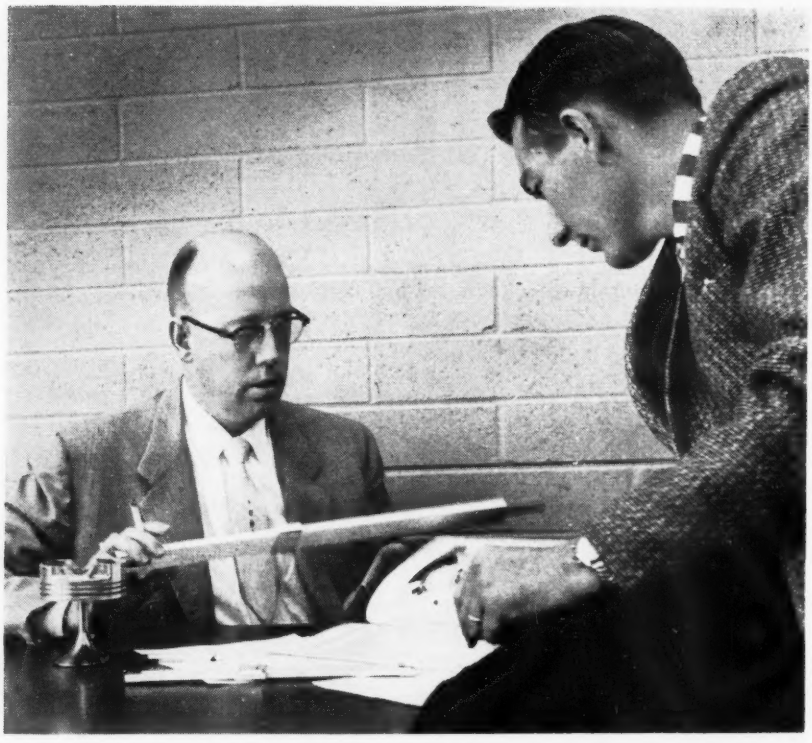
The material for the drum, epoxy-glass cloth, is optically cleaned and treated as a piece of glass which will be silvered as a mirror. Both the cleaning process and the method of silvering glass are described in detail in all editions of the "Handbook of Chemistry & Physics," published by the Chemical Rubber Publishing Company.

FLASH COATING ADDED

The drum, if treated as described, will be covered with a microscopically thin layer of silver which is electrically conducting. It is then given a flash coating in a silver plating tank to increase the thickness of silver. At this point the drum is coated with resist, dried and assembled with a positive image, exposed and developed. The developing will bare the silver wherever circuitry must exist. It is then plated with copper to the appropriate thickness and the resist is removed. The whole is then placed in nitric acid which removes the background of silver, and an ever so small amount of copper; thus, the finished product.

This same technique has been used for producing plated-through holes on standard laminates. □

Molded drum switch, right, as it appears when mold is opened. Far right, finger contacts added.



Engineers use the handbook to plan instrumentation for ballistics tests. It details limitations and capabilities of available photographic aids.

A very special hand book

Sandia Corp. in-plant publication keeps engineers informed of photo-instrumentation aids available.

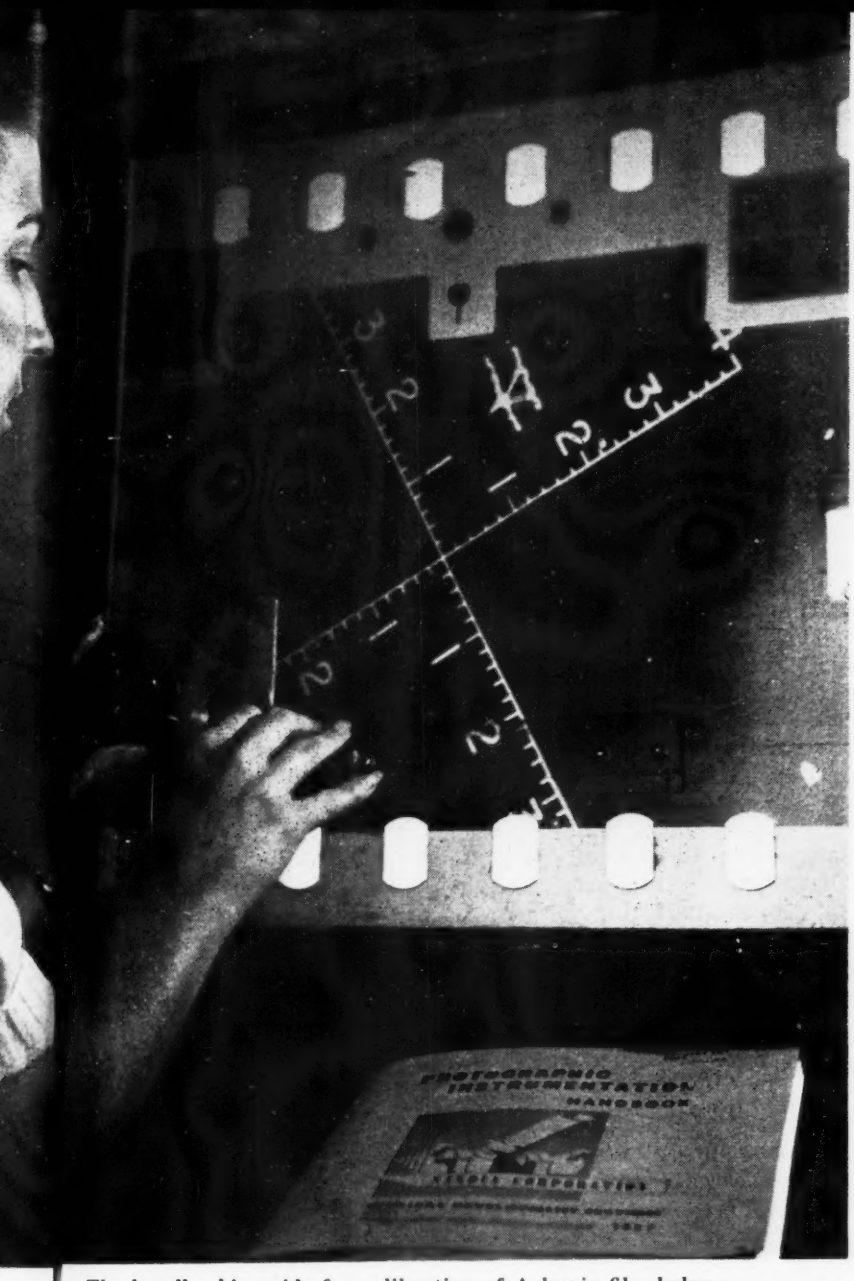
Photographic instrumentation is vital to the job of designing and developing nuclear weapon systems at Sandia Corporation's bases at Salton Sea, Calif., and Tonopah, Nevada. Both bases are equipped with extensive optical instrumentation systems, including huge tracking telescopes, Askania camera systems, and ultra high-speed cameras which record trajectories of test vehicles.

To provide development engineers and technicians with detailed information about the range instrumentation and photographic techniques available, Sandia's Optical Development Section recently published a "Photographic Instrumentation Handbook." In a sense, the handbook permits the engineer to take a "Cook's Tour" of remote ranges and their facilities without having to spend time on location to make these preliminary studies.

Complete Information

Complete information is given in the handbook on the uses, capabilities and limitations of cinetheodolites, tracking telescopes and night cameras. In addition, there is a glossary of photo-instrumentation terms. Fourteen half-tone illustrations show the various types of range photographic equipment in operation. In addition, valuable explanatory graphs, line drawings and numerical tables are also included.

Text and illustrations were prepared by Irvin W. Lenz, of the Optical Instrumentation Group. He pioneered some of the techniques used by Sandia in photo-instrumentation. The



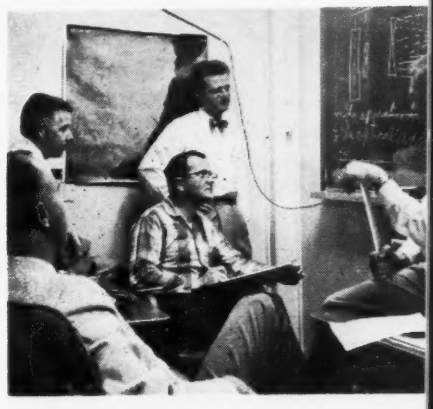
The handbook's guide for calibration of Askania film helps a data reduction specialist seen here viewing a film frame.

glossary of terms was compiled by the Group as a project.

Format of the book is the same as Sandia's standard reports. Copy was typed with proportional-spacing typewriters and the book was offset at the company printing plant. Page size is 8½ x 11, and the book is bound with metal fasteners to permit quick change of material. □

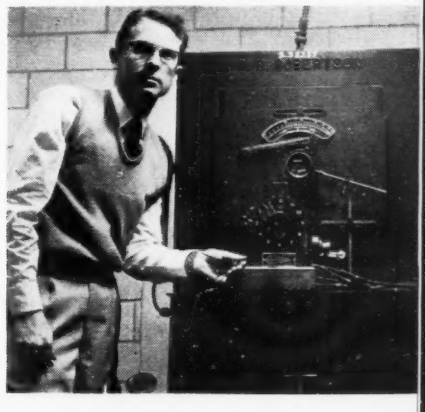
Irv Lenz, who prepared the text and illustrations, examines a scale model tracking telescope.

Group meetings of the Optical Development Group produced the concise "terms of the trade" in book.



Technical Illustrations Supervisor, Wally Ives, center, discusses problems with two company artists.

First step in offset printing is preparing a process negative of a paste-up page of the handbook.



Finished handbooks are bound in Sandia's printing plant. The print shop supervisor checks a copy.

A Special Report From
Hycon Mfg. Company

Low-cost film documentary

Expensive setups eliminated by taking advantage of scheduled events to shoot film's basic footage.

If it's important, and scheduled to happen anyhow, why not make a low-cost film of the event? The final stages of a research and development program, field testing of new company products or an unusual application of existing equipment can make the backbone of a newsworthy documentary film.

Key to the low-cost documentary lies in filming what is already scheduled to take place for engineering, testing or field utilization. The expensive "set-ups" that make a film really interesting can be shot in news style as events actually take place, and the script can then be adapted to utilize this otherwise costly footage. The scope of the completed film is then limited only by the ingenuity of the writer and photographer while the budget is largely limited to film and time charges.

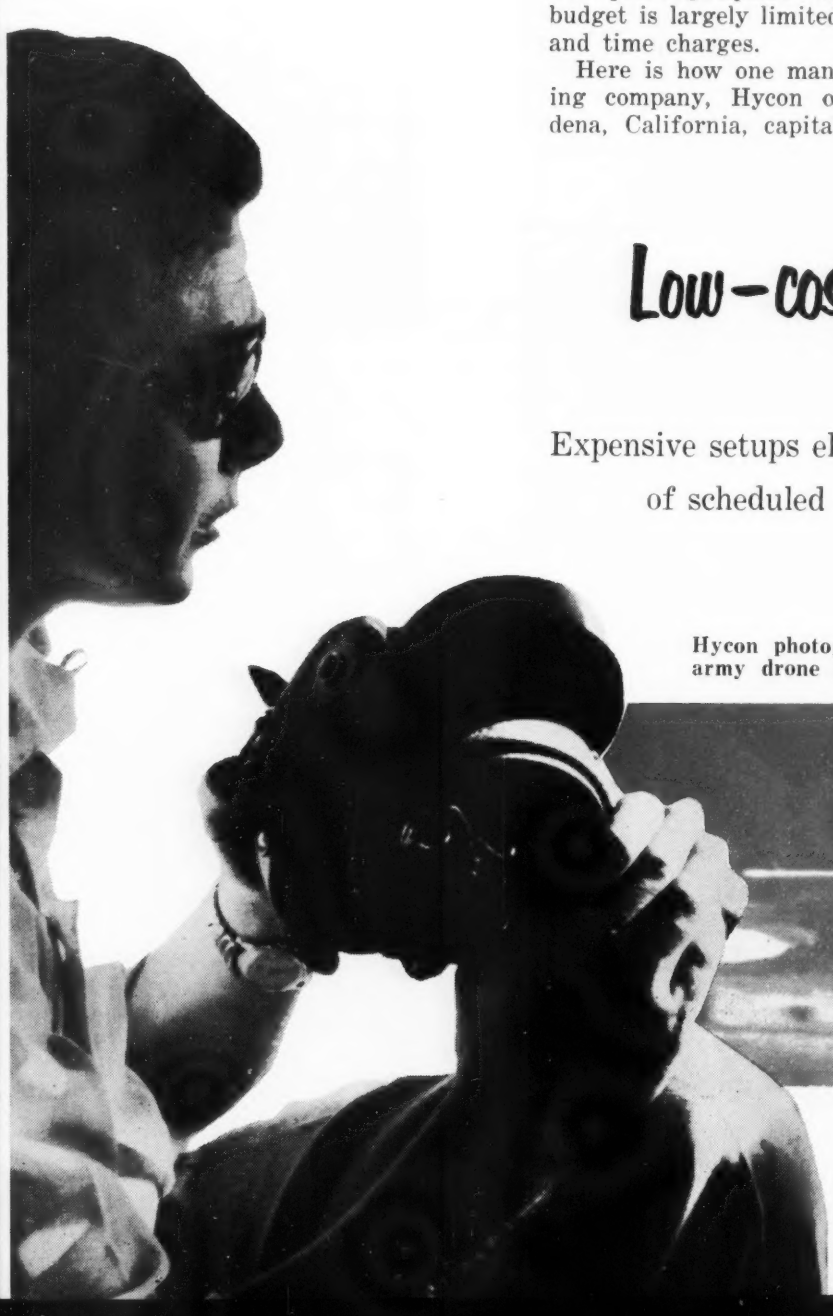
Here is how one manufacturing company, Hycon of Pasadena, California, capitalized on an up-coming event and wove it into a low-cost documentary film.

Among its varied products, the company produces a non-classified aerial reconnaissance camera used by the U. S. Army Signal Corps for drone photography. This KA-20 camera was a key item in military maneuvers, "Mr. Peepers II and III," planned at the Hunter Liggett Military Reservation in California. What better event to build a film around?

SCRIPT APPROVAL

At this stage of events, Hycon's Public Relations Director Don Downie wrote a basic story treatment and rough shooting script for both management and military approval. This script was detailed only to the obvious shooting areas and did not call out specific scenes that would cause interruption in the testing program.

After both company and military approval of the basic ap-



Hycon photogs recorded the full sequence of flight of an army drone plane from takeoff to subsequent crash. . . .

proach, both Downie and Jim Jarobe, a member of the Hycon Photographic Staff, flew to Hunter Liggett, armed with two 16mm Bell and Howell cameras and 5,000 feet of type A Kodachrome for three days of on-the-spot shooting.

Evaluation maneuvers like "Mr. Peepers" are scheduled in advance, and it was a simple matter for the visiting photographers to set up their shooting around the most spectacular activities planned for each day. In addition to the regular shots outlined in the script — camera loading, drone flights, film processing and field inspection—the two-man crew was able to bring back footage that no writer could conceivably put in his original scripting. The crew returned with a full sequence of a drone crashing on take-off, footage sufficiently clear so that Radioplane engineers (manufacturers of the drone) were able to establish the cause of the crash from single-frame enlargements. A second drone parachuted into the top of a tree, presenting some unusual photographic opportunities.

On film projects of this type where the cameraman must think on his feet and actually watch the details of the story evolve as he shoots it, film is the cheapest item on the budget. A shooting ratio of 10:1 for finished film is completely reasonable, and any lower factor is extremely optimistic.

Because of the military interest in the finished product, military aircraft were readily available. The Hycon pair flew in a DeHavilland L-20 with the door removed to make formation footage of larger QL-17 drones and manned L-19 aircraft. The wide-open area of this aircraft makes an ideal platform for shooting slower aircraft and air-to-ground scenes. Thirty-two or forty-eight frame-per-second speed reduced picture movement in these air shots.

SHORTCUTS APPLIED

At Hycon, where only two men work on a documentary film, unusual shortcuts can be applied. Since both are photographers, each will shoot key set-ups from what he thinks is the best angle. This develops a spirit of friendly competition where each man unconsciously attempts to out-do the other. The resulting scenes will then intercut perfectly. Incidentally, both cameras had been checked for proper frame alignment since a mismatch makes it impossible to intercut the footage.

Once the Hunter Liggett footage was processed and workprinted, the script was tightened. Additional maneuvers at Yuma, Arizona, and Fort Huachuca, Arizona, Headquarters of the U. S. Army Signal Corps Electronic Proving Ground, provided unexpected fill-in footage to expand the film. Flights at Yuma were planned to explore the limits of radar control for the photo drone, and cargo helicopters were used to retrieve the pilotless craft. This was natural news-type footage for such a documentary film.

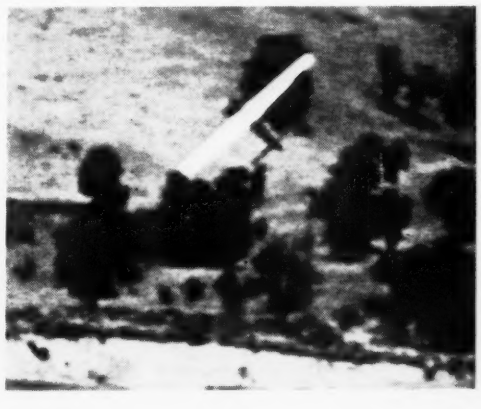
At Fort Huachuca, cooperative Signal Corps technicians conceived a temporary camera mount to put a GSAP electric gun camera on the drone, mounted above the engine and pointed toward the tail. The drone operator tripped the electric camera by radio control an instant before he fired the explosive JATO charge to hurl the drone into the air. The first GSAP flight produced a full 50-foot magazine of exciting "go-along-for-the-ride" footage.

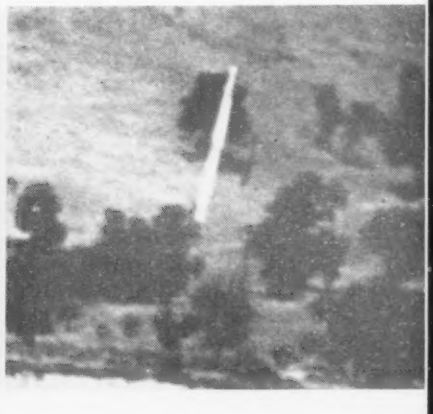
On the second flight, a malfunction in the guidance system put the drone out of control and crashed it into a wall ten seconds after take-off. The drone went home in a sack, and the GSAP camera looked like a disembowled fish. However, the magazine side of the GSAP remained bolted snugly to the steel mounting plate with the footage counter jammed on eight feet. When processed, the film showed the drone blast into the air, do a half-snap-roll, and then all was black.

Once photography in the field was completed, the work print was edited to "good picture" by Hycon's Jim Jarobe, a former Signal Corps photographer in Korea and professional motion picture projectionist. After the

continued on page 78

. . . and enabled engineers to determine precise causes of the crash from single-frame enlargements. The enlargements shown here follow the drone as it starts to oscillate, turns to the ground, and is about to hit ground

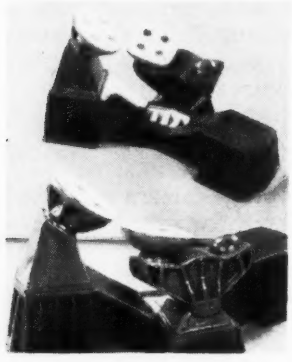


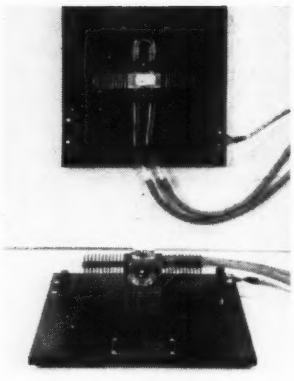


by J. J. BARTON
Staff Photographer
Franklin Institute Laboratories

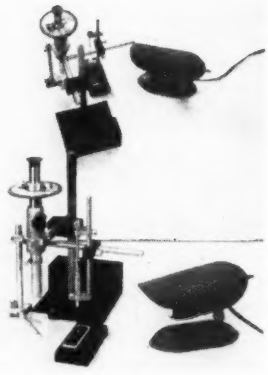
Reflected shadow shapes add dramatic interest to a standard photograph.

Mirror photography shows details on both sides of machine part recorded.





Front and top views simulate detail effects of an engineering drawing.



Overlapping above could be avoided by tilting mirror at greater angle.

It's all done with mirrors

Simultaneous "front and back view" photography cuts time and labor by eliminating camera angle changes and additional lighting setups.

Photographers in research and industry are often confronted with the problem of taking several views of a tool or part from different positions. This usually means changing camera angle, resetting the lights, taking new exposure readings, etc. At the Franklin Institute, we have devised a simple technique for handling these assignments by using a mirror to photograph a front and back view simultaneously.

Initial test shots made by angling a mirror behind a small part were so successful that we were persuaded to set up on a much larger scale for table top work. Mirror photography is now a standard service offered by the Photo Department.

Our layout table is three feet wide, seven feet long and 26 inches from the floor. We clamped a 3′x5′ mirror to a ¾″ wooden frame and fastened the frame to the table by means of hinges. A pulley arrangement attached to the top of the mirror permits it to be tilted as necessary. To make a neat

J. J. Barton is shown taking a mirrored table-top shot. Mirror photography, a standard service at Franklin Institute Laboratories, utilizes a standard view camera, three by five mirror and a three foot by seven foot layout table.

edge, the background paper used on the table is flush with the mirror.

The view camera, used for most table top photos, is especially useful in the mirror technique for correcting distortion.

For example, to get the operator and camera out of the mirror's field, and to obtain the desired view, the mirror must, of course, be tilted. For a direct and reflected back view of an object, the mirror is tilted forward only slightly and the vertical distortion corrected with the camera.

DEPTH OF FIELD

At this point, the next thing to be taken into consideration is depth of field. This is extremely important because both the object and the mirror image behind it must lie within the field at close distances. Since this field is very shallow, camera alignment and focus are critical.

As in most table shots, the lens should be stepped down considerably ($f/32$, $f/64$) to insure good depth of field and a sharp clear photo. Of course, exposure time will be longer, but with today's high-speed films, this causes no problem.

For showing reflected top views, the mirror must be tilted at an angle of 45° or more. Again, the above mentioned distortion, depth of field, and focusing must be taken into consideration.

When lighting a subject, it must be remembered that the light used for foreground lighting is backlighting in the mirror. Here's another thing to look out for if you are planning to use spot lighting: the concentrated light of spots will sometimes cause a double reflection along the leading edge of the reflected view on the mirror. It could be eliminated by using a front-surfaced mirror, which is quite costly. However, by using flood lights (spread lighting) this double image will very seldom be seen and will not be objectionable.

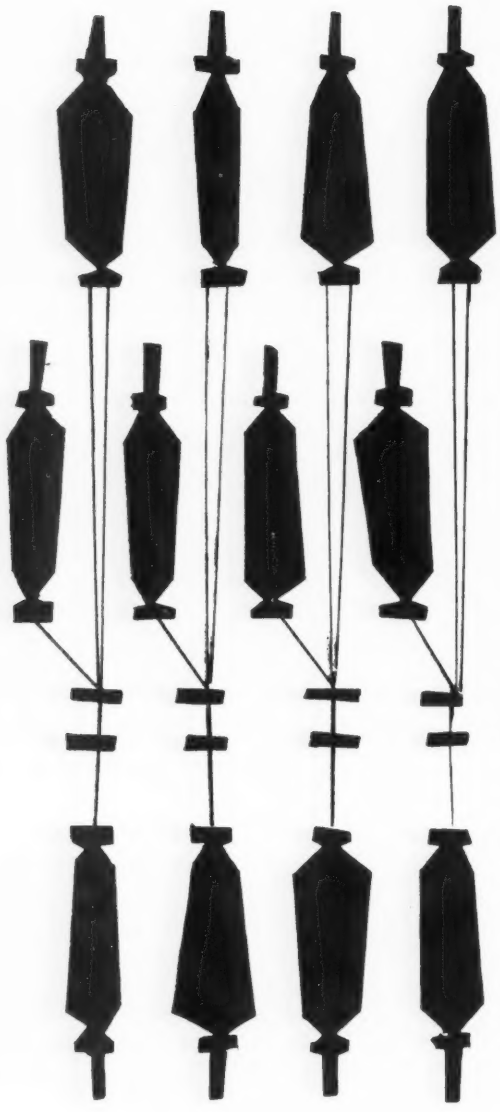
We first thought that the horizontal line running across the photo, separating the actual image from the reflected image, would be objectionable. (This line is the junction of the background paper and the bottom edge of the mirror.) It could have been airbrushed out, but we decided to let it appear in the prints. A notation in the reports for which these photos are usually made indicates that the image in the upper part of the photo is a reflected view of the subject.

TAKE CAUTION

Caution should be taken to place the subject on the table in such a way that the reflected view (be it top or back) will not blend with the actual subject by overlapping any part of it. This obscures the effect of the double image.

There is no limitation as to the size of the mirror. For small parts, a smaller mirror could be used. The maximum size will depend on the studio area, parts to be photographed, etc.

It might be interesting to expand the reflection technique by adding more mirrors and experimenting with triple, quadruple or even more images. □



Time-lapse cinematography

Researchers investigating textile problem use photo technique so that four to five hour process can be studied in three minutes.

by JOHN H. WIDMYER
Research & Development Ctr.
Armstrong Cork Company

Staff personnel at the Armstrong Cork Company's Research and Development Center are finding that time-lapse motion picture photography is helping them to discover within a matter of minutes the answers to a wide variety of industrial problems which once necessitated time-consuming investigative techniques. Recently, a research team studying the problem of "eyebrow" formation on textile roll covering materials used this photographic technique to striking advantage.

As suppliers of synthetic roll coverings used on textile fiber drafting equipment, Armstrong researchers were interested in getting a close-up picture of the rate of formation of "eyebrows" —short or free fibers that do not twist into yarn during the final or "twisting" operation—during the drafting process. As this waste collection builds up on the roll covering surface it extends into the yarn travel path causing breakage or defective yarn.

As an aid to remedying this problem by developing improved composition materials for roll coverings, the Textile Section research team set up photo-monitored test runs of conventional and newly-developed composition materials.

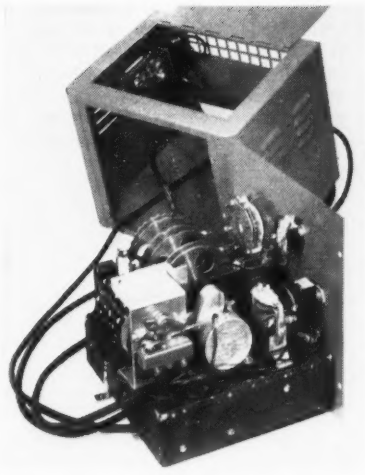
For this project, Type "A" Kodachrome 16mm film was used in a Cine Special operated at the rate of one frame every four seconds for a period of four and one half hours. Artificial illumination was supplied by two RSP No. 2 lamps, located approximately 36 inches from the subject. New lamps were used since continuous illumination was needed for the entire testing period and lamp life was estimated at approximately six hours. Camera lens settings were determined by taking an exposure reading with a Norwood Director Incident Lightmeter.

"EYEBROW" BUILD UP

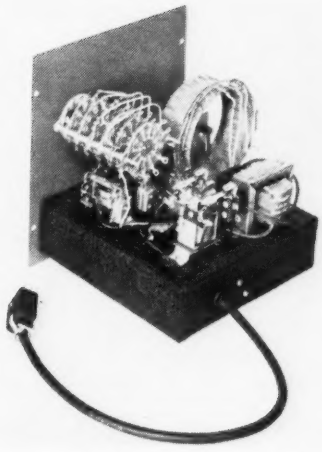
When the film was projected at 24 frames per second, researchers could observe in approximately three minutes a four and one half hour process during which "eyebrow" build up developed noticeably on conventional roll coverings, but only negligibly on the newer materials tested. The photographic study enabled this group to subsequently recommend more suitable roll covering materials designed to reduce the problem of "eyebrowing," for Armstrong customers.

Instrumental in the increased use of time-lapse photography in the company's research and development operations, was the recent development of a special time-lapse control unit designed for use with a standard 16mm Cine Special.

An unusual feature of the new



Initial control had settings of 1, 2, 5, 10, 15 and 30 minutes.



Second unit had intervals of 2, 4, 10, 20, 30 and 60 seconds.

unit, which is capable of making exposures from one every second to one every 30 minutes, is a motor-powered drive arm hookup that automatically turns the camera hand crank one revolution, eliminating the need for use of the camera spring motor, and permitting uninterrupted exposure of a 100-foot roll of film.

The power unit to drive the hand crank is attached to the camera by means of an aluminum frame specially rigged to the usual mount arrangement. A cam, mounted on the motor shaft, operates a micro-switch to stop the motor after it has made one revolution.

Designed by the author working in cooperation with J. W. Brinser of the Research and Development Center's Photographic Section, a control unit giving time intervals of 1, 2, 5, 10, 15, and 30 minutes was developed initially.

In this unit, six notched brass discs are mounted on a timing motor shaft which makes one revolution every 30 minutes. Each disc operates a microswitch. For example, one disc has a single notch that closes a switch once every 30 minutes. Another disc has 30 notches which close its switch once every minute. By means of a six-position switch, mounted on the front panel of the unit, it is possible to select any one of the six designated time intervals. Since it is necessary to make use of artificial illumination only during actual exposure time, provision was made initially for automatically turning on standard lighting equipment, making the exposure, and then turning off the lights immediately following exposure time.

The basic operational features of the unit are relatively simple in design. When a microswitch is closed, a relay operates which closes the lighting circuit through mercury contacts. This action simultaneously initiates a time-delay relay. Following the lapse of one or two seconds, the relay closes and discharges a condenser through a 2500 ohm relay. This relay in turn closes for a fraction of a second and starts the camera motor long enough to move the cam off the microswitch.

AUTOMATIC STOP

Upon completion of one revolution of the camera motor, the cam again is in control and the motor stops automatically. After the timer contact is completed—which may not be for one or two seconds longer—the first relay opens and the artificial illumination shuts off. Subsequently, the time-delay relay returns to its normal position, recharges the condenser, and the unit is ready for the next exposure.

continued on page 75

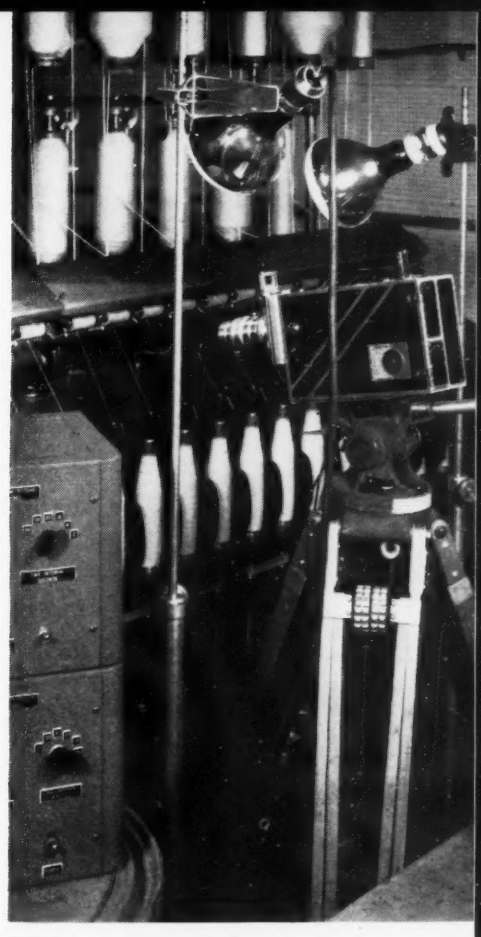
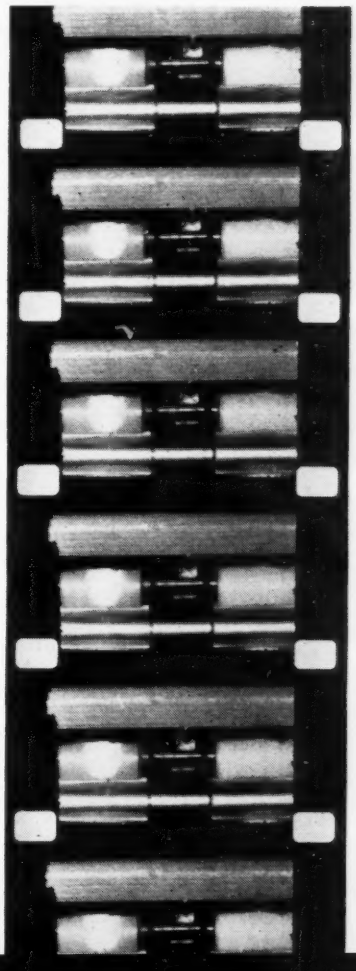
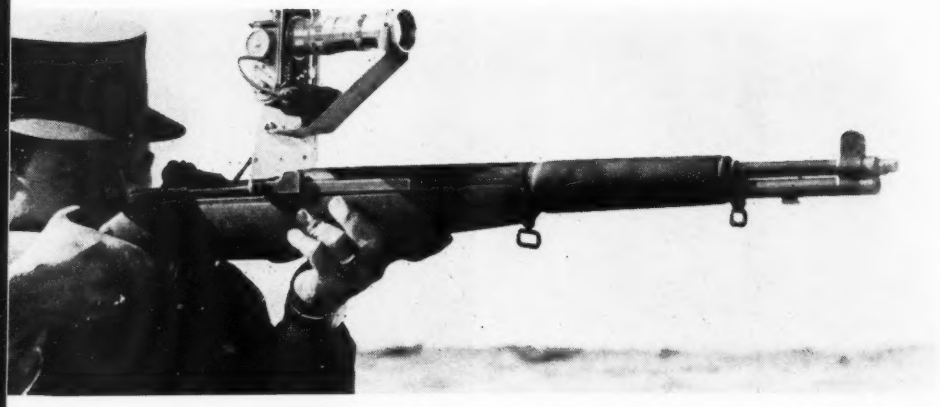
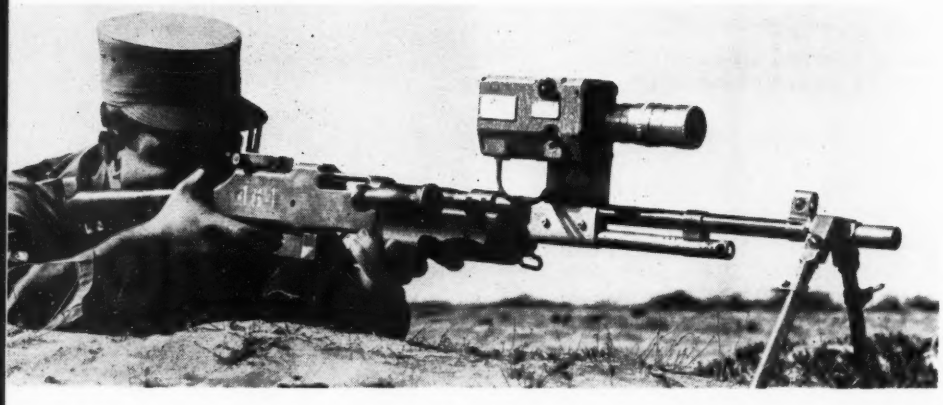


Photo setup for filming time-lapse movies of "eyebrow" formation on textile roll.

Time-lapse strip compares negligible "eyebrowing" of composition roll, right, with that of regular roll.







Photographs at the left show a 35mm still camera mounted on an M-1 rifle (top) and a 35mm motion picture camera mounted on an automatic rifle (bottom). The weight of the M-1 rifle, camera, mount and accessory equipment is about 11 pounds. Squeezing the trigger actuates the camera.

Photo check on fire power

Effectiveness of rifle-fire "hits" against low-flying aircraft checked by equipping weapons with 35mm still and movie cameras.

For front-area infantrymen to fire live ammunition against low-flying aircraft in a test of a plane's vulnerability to rifle-fire would surely provide accurate fire power data, but it would add little to the pleasant relationships between U.S. airmen and foot soldiers.

The U. S. Army Combat Development Experimentation Center, Fort Ord, California, therefore, was called upon to devise some means of accurately recording rifle-fire "hits" on aircraft so that analyzing personnel could determine potential effectiveness of forward area ground fire. It was decided that a camera on the rifle would do the job.

Obviously all the conditions of scientific analysis would be met if a photograph was taken each time a soldier "fired" his rifle at an aircraft. This would allow for an accurate visual record of his fire, where he "hit" and what damage might have been caused.

CDEC was looking for a comparitively light camera that could be mounted coaxily with the bore of the weapon and wired to the trigger so that the "firing" of the weapon would trip the shutter and record, at the exact time of the "shot," the target at which the weapon was shooting. After several weeks of experimentation with cameras and trigger systems, the development team settled on a Robot 35mm automatic camera (Star Model) actuated through a solenoid hookup when the trigger of the weapon was pulled.

32 RIFLES EQUIPPED

Altogether, the camera, the aluminum mount and necessary allied equipment on the rifle weighed approximately 3 pounds. Since the standard Army M-1 rifle weighs about 8 pounds, this made the total unit weight of 11 pounds, a figure that was not excessive when put to use by the individual. For the experiment, 32 rifles were equipped in this manner.

The Robot camera was fitted with two lenses—a 3″ Schneider-Kreuznach Xenon and a 6″ Schneider-Kreuznach Tele Xener—to meet the requirements for different test phases. During most of the experimentation, Ansco Supreme film was used. Shutter settings were usually 1/250 at $f/11$ or $f/16$.

In addition to using 35mm still cameras, 35mm motion picture cameras were used on weapons that had an automatic firing capability. Since the rate of fire

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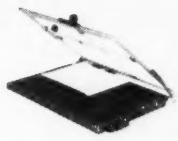
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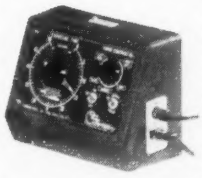
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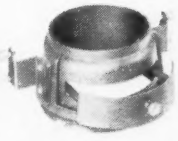
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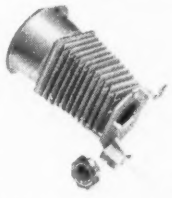
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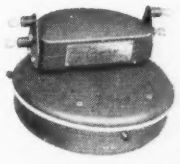
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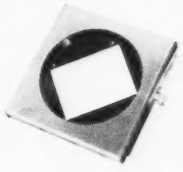
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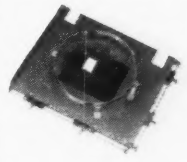
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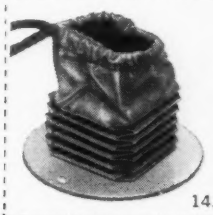
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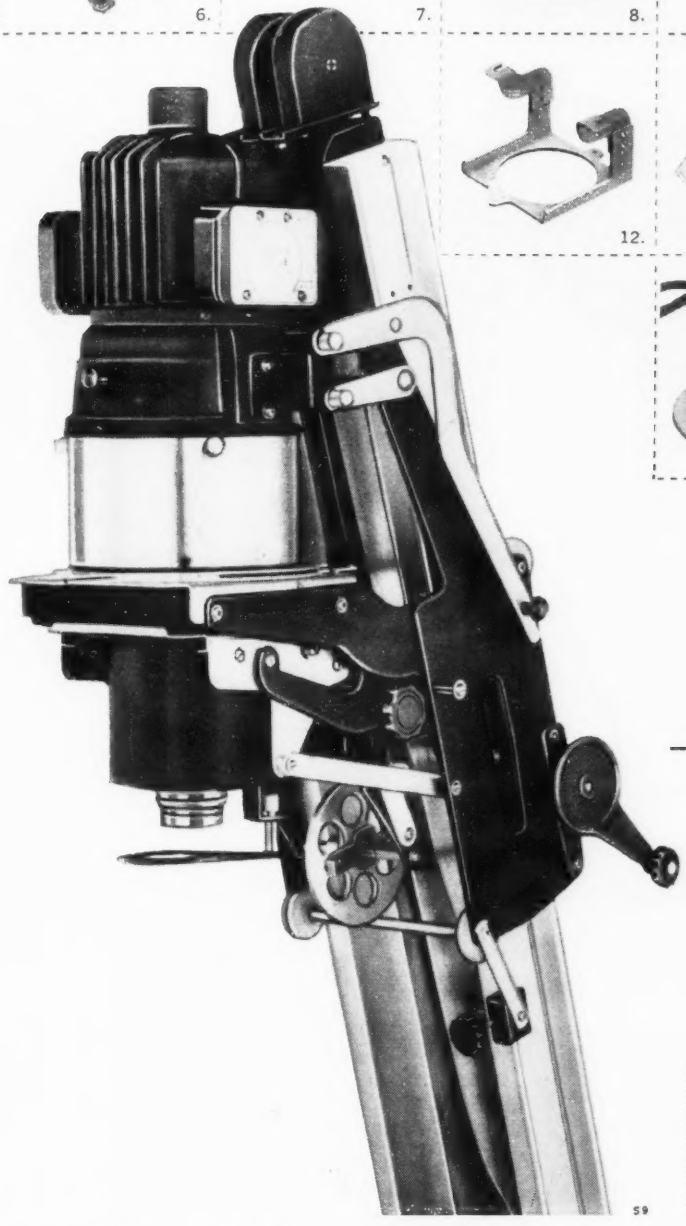

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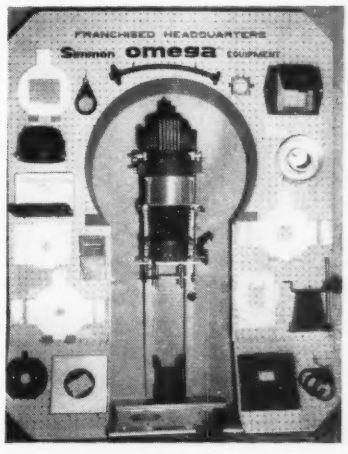

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of these automatic weapons is such that adaption with a 35mm still camera would not permit determination of the full functional capabilities of the weapon, a Gordon Enterprises gun camera was mounted on each test weapon in much the same way as the Robots were.

Photographically obtained records of rifle fire power were broken down by the CDEC Data Analysis Team. A variety of devices were used. For example, preliminary data was extracted from the gun camera film by running it through a modified microfilm reader. At one stage, separate frames were projected onto a screen over which was laid a device which accurately measured the point of aim of the rifle and accounted for the "drop" of the projectile due to gravity and motion of the target aircraft.

EACH FRAME PROJECTED

The final step in the study of the film came when each frame was projected onto a two-way acid etched glass screen and the aiming point on the aircraft (4′ x 1′ painted crosses) studied. The weapon's point-of-aim was located on the displayed film from the fiducial marks within the camera. A gridded transparent overlay was then placed on the viewing surface, which, when aligned, indicated the true point of aim.

Gravity drop was taken into account by shifting the overlay down a distance mathematically related to the range (firing distance in feet) over which the weapon fired. The problem of lead was handled in essentially the same way—moving the overlay to compensate for the movement of the aircraft during the time of the theoretical flight of the projectile.

Once established mathematical computations (projectile speed, aircraft speed, etc.) had been completed it was relatively simple to figure out the exact spot where a projectile would have struck. This information allowed engineers to determine how much damage would have been done with a direct hit at a given spot on the plane. □

Movie film is edited, marked and catalogued after the experiment before being sent to the CDEC team for analysis.

A device laid over a screen on which are projected single frames enables checkups on rifle fire aim and accuracy.

Finally, frame is projected onto two-way screen and checked with a gridded transparent overlay for true point of aim.

"YOU CAN'T MISS with an ARRIFLEX 35"

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says Jack Painter, A.S.C.
Chief Photographer, Movietonews, Inc.

"I've travelled many times all over the world with my Arriflex 35, and have used it under the most trying conditions. It has never failed me," says the globe-girdling chief cameraman whose Fox Movietone newsreels are shown both here and abroad.

"Arriflex 35 was with me when I shot the Cinemascope color short about the 'A Bomb' called 'Survival City'. Travelogues and documentary pictures—in Cinemascope or 'plain'—both in foreign countries and in the United States were taken with my Arriflex 35. Arriflex was the only camera we had with us—no others could have done the job as well!

"Because it is a reflex camera, the Arriflex 35 has resolved our photographic problems. With an Arriflex 35 you know what you're getting."

Photograph shows Jack Painter, a veteran of 39 years of service with Movietone News, Inc. shooting a street scene with his Arriflex and Pan-Cinor model 150 varifocal lens.

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Author takes on-the-spot transparency of potential application of company product.

Audio-visual briefing

Transparency-in-the-camera film solves sales education problem.

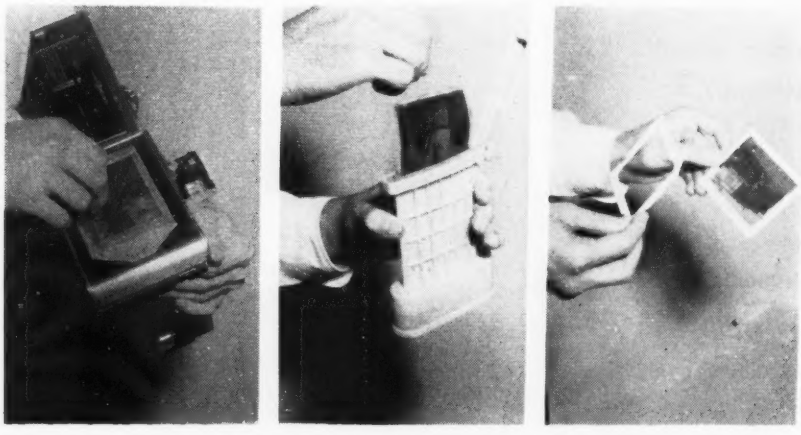
by ALAN C. HART
Bridge Oil Co., Inc.

Since Bridge Oil is always adding new items to its line of industrial lubricating oils and greases, it's imperative that we keep our sales staff briefed on the exact application of these products. To a great extent, customer satisfaction depends upon the salesman's ability to size up mechanical equipment and recommend the proper lubricant.

I decided that the simplest way to meet this sales education problem would be to run impromptu slide shows at our regular company sales meetings. While projecting transparencies of unusual pieces of customer equipment, I provide an informal running commentary on just which company products would keep these items in top working condition.

To keep the entire operation —from taking, to processing, to mounting—within the company, we invested in a Polaroid Land Camera, a supply of Type 46 Projection Film and a Polaroid Model 610 Projector.

Whenever I come across a piece of customer equipment which just "cries" for one of our products, I shoot a slide for showing at the next sales pow-wow. Since the transparency is processed right on the spot—a hand-size tank of processing solution is supplied with the film—I can be sure that I've got my picture before leaving. As a matter of fact, the completed slide is processed, set in its plastic mount and already for projection before I leave the site. □



Film is developed in the camera for two minutes, stripped from the camera, left, and processing completed in portable hardening tank, center. Projection-ready slide is inserted into plastic mount, right.

Transparencies are projected at regular company sales meetings. Hart supplies an informal running commentary to keep salesmen up-to-date.

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J. J. B., Bellevue, Ky. . . ."It's the one camera that does what my previous two did."

M. G. J., Washington, D. C. . . ."I do medical photography and checked all cameras for use in eye operation photography and this is the best . . ."

M. L. R., Dalton, Ga. . . ."This is my second Exakta. The first, is still going strong after five years of hard usage. I cannot praise the Exakta too highly."

A. T. B., Waltham, Mass. . . ."We now own three Exaktas—**two** for color—**one** for black and white."

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L. E. S., Tacoma, Wash. . . ."This is the second Exakta I have bought this year."

A. J. S., Seattle, Wash. . . ."Wonderful for versatility and performance."

A. B. R. Macomb, Ill. . . ."I have used it for the past two or three years and I think it is one of the best ever. I would not trade it for any other camera that I have ever handled."

R. J. S., Duarte, Calif. . . ."the camera with the most."

Dr. G. R. T., Ft. Thomas, Kentucky . . ."We are using your Exakta camera in our Pathology laboratory and are very well pleased with it."

R. A. R., Richland, Wash. . . ."Only camera for precision close-ups of the mouth and teeth. Also best for close-ups of flowers."

R. A. S., Pleasanton, Calif. . . ."I am using an Exakta equipped with both viewfinders . . . I found this combination hard to beat."

V. R., Berkeley, Michigan . . ."I have been an Exakta owner for many years and my friends and I think there is no finer camera."

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K. K. R., San Diego, Calif. . . ."as a teacher in color photography the advantages of the Exakta over any other camera have convinced many students their work can be improved by using an Exakta. The Exakta is the most versatile 35mm camera made."

L. E. S., Tacoma, Wash. . . ."I think it is the best camera on the market."

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T. J. S., Arlington, Va. . . ."I own an Exakta myself and have enjoyed using it for the past three years."

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L. S. B., Raleigh, N. C. . . ."I can say that I made the purchase of not only one, but two cameras. They have given very good service."

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Photographer (above) takes stage coordinates on a 35mm vertical photomicroscopic setup. The set-up takes 9x12cm, b&w or color.

Medical photography IN COURT

Color slides and black-and-white photographs prepared by West Penn Hospital's Photo Lab help to resolve legal tangles.

Photo technicians (right) at work in the hospital's darkroom. West Penn's Photo Dept. prepares lecture slides, photos for house organs, and legal-medical photos.

by JOHN F. VETTER

Photography in the hospital field has grown to encompass wide and varied objectives. A medical photographer's day might include the filming of an operation, making up slides for a lecture, taking pictures for house-organ or fund-raising purposes, or providing evidence in court cases resulting from accidents.

A typical case of medical-legal photography occurred last summer when an accident victim brought to Pittsburgh's West Penn Hospital died a few minutes after arrival. The patient —we'll call her Mrs. Brown—had been the driver of an automobile that had suddenly careened into a wall for no apparent reason. An autopsy showed she had suffered a fractured skull and a heart attack.

The medical photographer was called to the autopsy room to photograph the skull and other superficial body injuries. Color slides were made with an Exakta and black and white photos with a 4 x 5 Linhof. Lighting was by flash.

Later, in the photo lab, the removed heart was again photographed in color and black and white, first as a whole organ and then in parts as specified by pathologists. Photomicrographs were made of the occluded coronary artery.

The photographs and slides were then filed in a cross-indexed system according to patient, organ and disease. They are available to teachers at the Hospital and at the University of Pittsburgh Medical School.

ACCIDENTAL DEATH CLAIM

Some months after Mrs. Brown's death her family sued her insurance company for double indemnity payments for what the family claimed was an accidental death. The insurance company held the death had been caused by the heart attack—defined as a natural cause — and that it was not liable.

When the case came up in court, the photographs taken at the post-mortem were supplied as evidence. They and the pathologist's testimony led the court to determine that death had been caused by the heart attack and that the other injuries, including the fractured skull, had resulted after the attack.

In this and other legal cases and for educational purposes, photographs provide the essential facts of a patient's medical history, facts which otherwise would not be available unless the Hospital preserved and stored the actual organs.

The photographs take the place of these specimens with the consequent saving of money, time and storage space. □

Rapid-Sequence Spring Motor—Ten photographs in five seconds can be taken with a single winding! $69.50

50-Foot Capacity Bulk-Film Magazine—Used alone or with Spring or Electric Motor to take up to 420 35mm frames without reloading. $69.50.

Electric Motor-Magnetic Remote Control—Push-button, remote-controlled electrical operation of camera as far as 75 feet away. $150.00

Extension Bellows and Tubes (Regular or reverse)—Exceptional aids in macro and microphotography. Offer optical ranges from life size to more than 10-time magnification. $12 to $59.50

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Really two cameras in one for unmatched versatility! The most advanced 35mm single-lens reflex camera combining rangefinder speed with reflex control. Brilliant array of features unmatched by any other fine camera! Sensational, unique accessories!

Take your choice of three fine automatic lenses: f/2.8, 50mm C.Z. Jena Tessar; f/2.0, 58mm C.Z. Jena Biotar; or f/1.9, 55mm Steinheil Quinon.

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Here today—obsolete tomorrow! That's the pattern with most cameras. That's why you should protect yourself—select a camera with **years-ahead** design—a camera so far ahead of the field that it will be up-to-date—not **out-of-date**—years from now!

And that's why the incomparable Praktina FX and Praktica FX3 are your best buys in the fine camera field. Here are **tomorrow's cameras today.** Here are the **features of the future**—that other cameras will be imitating in the years to come. Here is assurance that you will still be the proud owner of a camera that's the unquestioned leader in its field . . . years from now!

THE TOP-VALUE

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Smart choice of the professional... for wide-angle or telephoto work, macro and microphotography, process or action shots!

The only popular-priced camera that gives you all 3 top features in expensive cameras today: (1) Internally-coupled automatic lenses. (2) Lens Interchangeability. (3) Two-way single-lens viewing. The best dollar-for-dollar value in the fine camera field!

Praktica FX3 Automatic available with either f/2.8, 50mm Westanar, f/2.8, 50mm C.Z. Jena Tessar, or f/2.0, 50mm Westagon . . . all with automatic diaphragm control.

Also available: Praktica FX2 with either f/2.8, 50mm C.Z. Jena Tessar, or f/1.9, 58mm Huge Meyer Primoplan lens, pre-set diaphragms.

See the Praktina FX and Praktica FX3 today C-5

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Restaurant owner, Gene Goldenberg, points with pride to photo of his establishment presented to him by his restaurant equipment dealer.

Saying it with photos

Restaurant supplier wins customer good will; says congratulations with photographs of new installations.

Though the language of flowers may be appealing, their message, unfortunately, lasts no longer than their bloom. In seeking for a more permanent and novel way to congratulate his customers on opening day, a Philadelphia restaurant equipment dealer has decided to say it with photos.

As O. A. Gruenewald, president of Gruenewald Specialized Equipment, explains, "As soon as we complete a food installation, we advise the customer that our photographer will call to make arrangements for photographing the place." Three different views are made and the customer given his pick of the proofs. He then receives six 8 x 10 prints of his favorite shot and a couple of prints of the other views—all with the compliments of Gruenewald's.

"Our salesman," Gruenewald points out, "usually tell the customer about the pictures at the time of closing the deal. We feel it helps to enthuse the customer and facilitates clinching the sale."

All extra photos go into the firm's sales promotion files. The sales personnel report they find these installation shots useful in telling and showing a prospect how similar equipment would look in his restaurant. □

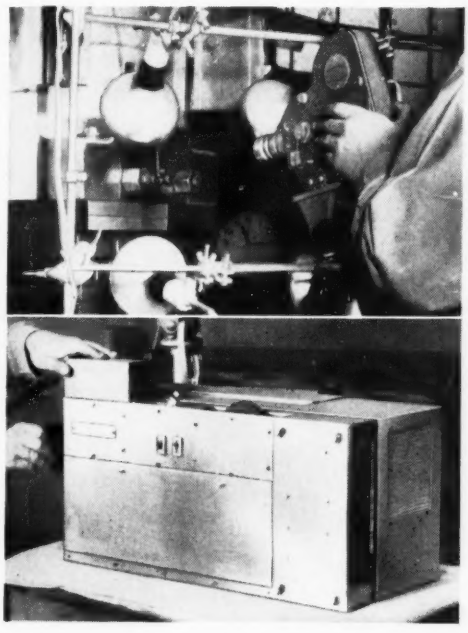
NEW "MINI-RAPID 16" PROCESSOR

analyzes punch press job in

23 MINUTES FROM SHOOTING TO SCREENING

The new Fairchild "MINI-RAPID 16" is a compact, portable, easy to operate, easily maintained machine with only two controls . . . the on-off switch and an adjustable feeding control which regulates the processing cycle. It develops dry to dry at six feet per minute while still attaining commercial quality.

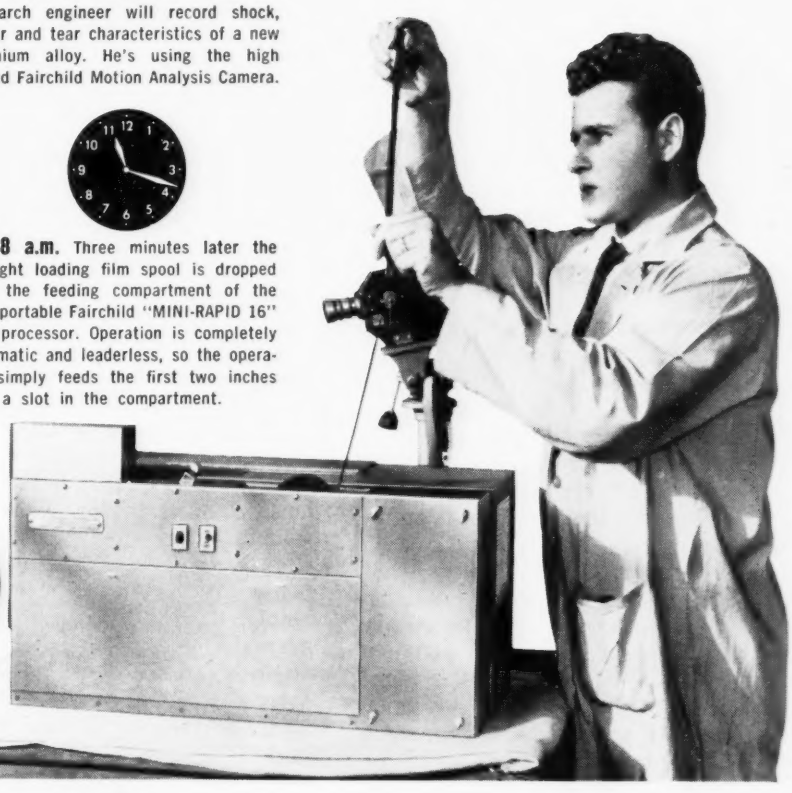
It's about the size of a standard file drawer. The unit features plastic film transport inserts and easy-changing tanks containing a high speed developer, a rapid fixer, a hypo eliminating agent and a static rinse. You can also use an accessory fitting for circulating water. Drying is done by a high velocity air jet on the emulsion side of the film. Lengths as short as one foot or as long as 400 feet may be processed without touching the chemical solutions.

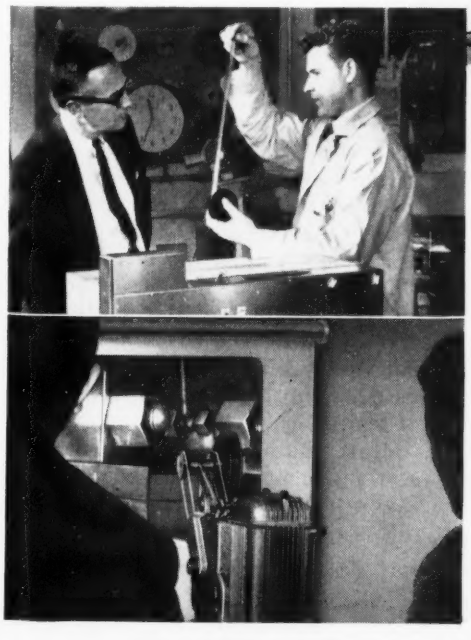


11:15 a.m. In a matter of seconds this research engineer will record shock, shear and tear characteristics of a new titanium alloy. He's using the high speed Fairchild Motion Analysis Camera.

11:18 a.m. Three minutes later the daylight loading film spool is dropped into the feeding compartment of the new portable Fairchild "MINI-RAPID 16" film processor. Operation is completely automatic and leaderless, so the operator simply feeds the first two inches into a slot in the compartment.

11:20 a.m. The first few feet are already emerging, dry and ready for inspection. The operator can make adjustments to compensate for exposure or chemical temperature variances by merely turning the drive speed control knob.





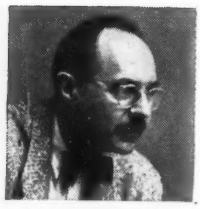
11:34 a.m. The 100 foot roll is completely developed, ready for projection. It travelled through the "MINI-RAPID 16" at six feet per minute.

11:38 a.m. Only 23 minutes after shooting, the film is projected and the punch press operation is being analyzed by design and test engineers. This ability to develop and project on a screen within minutes after shooting will increase the value and broaden the scope of engineering photographic work.

Add a new dimension to your motion analysis studies, write for prices and delivery. Ask for a demonstration in your own plant or office. Fairchild Camera and Instrument Corporation, Industrial Camera Division, 5 Aerial Way, Syosset, Long Island, New York. West Coast office: 6111 E. Washington Blvd., Los Angeles, California.

FAIRCHILD
CAMERA AND INSTRUMENT
CORPORATION

. . . for more details circle 535, page 73



Industrial Workshop

by DAVID B. EISENDRATH, JR., Technical Editor

SOME COMMENTS ON LENSES, MISSILES, AND MISCELLANEA

In a recent column I discussed many of the qualifications and characteristics of view cameras and what a view camera might or should have if it is to be used for "corrective" photography. This implied that you were really going to make use of swings and other movements which a good view camera must have. One of the things I did not mention is what *you* must have to get the most out of the view camera—in addition to know-how, I mean. And this, of course, is proper optics to supplement the mechanical requirements for "corrective" work.

It is foolish to sink a lot of money into a good view camera and then not have lenses to enable you to take advantage of the extreme swings that I was so insistent on. You would do well, therefore, to have lenses that have good coverage in addition to being very sharp. There are two kinds of coverage you can get in a lens. One is a large circle of illumination — which means that a lens will produce a large area of light. In addition, there is the lens which has a large circle of critical definition. This means that it not only will produce a large area of light, but that the image will be sharp over this whole area.

Making Sure

There are several ways to make sure that your lenses have good coverage. One way to do so is to use long lenses. A lens that will cover an 8x10 piece of film well will be excellent for covering 4x5 and give you enough area of critical resolution on all sides to let you swing, twist, tip and tilt, almost to the limitations of the camera. A long lens will also give good perspective and correction.

However, in industrial work we can not always get away with using long lenses. Much of the time we are working with our backs to the wall (which may be a hot boiler) or in a confined space, or from a platform or scaffold which just can't be moved back any more. This means the use of short lenses, and it's here that I have to stress the need for good lenses. I am appalled when I see some of the "press type" cameras that now have rising front and some basic swings, and discover that they are normally supplied with lenses that just barely cover the film from edge to edge sharply unless they are stopped all the way down.

I use top quality wide-angle lenses not only for wide-angle work. Even the normal and slightly long focal length lenses I use are wide-angle. For example, on the 4x5 camera, my normal lens is a 6½ inch wide-angle lens. Sure it covers 4x5, most good 6½ inch lenses would. Mine, however, will cover a 5x7 very well, so when I begin to use the swings and shifts of the view camera, I have a wide enough circle of critical illumination to permit the use of the extreme movements of the camera.

A question sometimes crops up here and I am often asked whether a wide-angle 6½ is as good as a regular 6½ inch lens when you do not need all the swings and movements. The answer is a hedging one: probably not, but if you use top quality lenses you probably won't be able to tell the difference—unless, of course, you're trying to do process work with a regular lens.

For example, the Schneider Angulon 165mm lens will cover almost an 8x10 film; on a 4x5 camera it gives a lot of leeway for movement when extreme camera manipulation is desired. But, is this lens as sharp as, let us say, a 6½ inch Dagor? My own impression is that it is probably not *quite* as sharp, although for most uses I can't seem to find the difference. They are both exceptionally good lenses.

The same goes for longer lenses. The 210cm Angulon has extreme coverage and has a large circle of critical definition. I don't think it is *quite* as sharp as the 8½ inch Commercial Ektar or the 8½ inch Dagor. The wide-angle Angulon is excellent, however, and note that the Dagor, when stopped down, will cover a 10x12 film size.

The point is that there is so much you *can* do with a view camera if you have the lenses to go with it.

Mounting Lenses

An incidental suggestion which I pass on here (and may well be worth the price of admission—or the tedium of reading through this column) and which may be of great value to you is this: for years I have been mounting my lenses off-center on their lens boards. Not indiscriminately cock-eyed, of course, I mount my lenses centered vertically, but almost to the top of the lens board. If your lenses have extreme coverage, this gives you more versatility in camera movements in rising or falling fronts. When I want the lens to be dead-center, I just drop the front until the lens is in the center, where it normally might be. But if I need more of a drop movement than the camera allows, I turn the board upside down so that the lens is now off center toward the bottom, and by using the extreme drop movement of the view camera, gain as much as an extra inch of movement.

Most photographers who have seen my demonstrations of working on location, have been de-

continued on page 44

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'industrially preferred' speedlights

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Economy units fit all 'X' or 'M' synch. cameras. Operate from AC and 'D' cell batteries.
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Versatile, lightweight portables. Wide choice of power supplies and accessories. Light equivalent to #5 flashbulb.
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Complete, self contained setups for home portraiture, industrial, scientific and commercial photography. AC or dry battery.
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Preferred by press—high powered and versatile. 2 models, AC or nickel cadmium battery operated.
ascorlight SERIES 500
Finest portrait studio speedlights available. Full ratio control. Choice of 4 light units.
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Pound for pound, the highest-powered lightest weight units available. Two size power supplies, 4 light unit styles available.
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High speed, heavy duty semi-portable commercial installations for industrial and commercial color work.
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Preferred by top professionals for custom-built studio installations. Incorporates Ascor's exclusive "building block" design.
ascorlight SERIES 900
For repetitive flash work, where multiple images are to be recorded. Synchronized for motion picture instrumentation work.

It's no wonder that more and more industrial, scientific and commercial photographers have learned to depend on Ascor for their lighting needs. They know that all ascorlights are ingeniously designed and superbly constructed to provide outstanding results everytime. And that's not all... they've learned that Ascor's exclusive "building-block" design permits adding and interchanging power supplies, light units and accessories to meet future requirements as they arise, without making existing equipment obsolete. So make the right move now... let your authorized Ascor dealer help you select the *right* Ascorlight for *you*.

Write for illustrated data sheets, name of your local authorized Ascor dealer and information about Ascor's Equipment Leasing Plan.

Ascorlights are sold only by authorized Ascor dealers. Look for this sign of service and satisfaction . . .

AUTHORIZED ascor Speedlights DEALER

AMERICAN SPEEDLIGHT CORPORATION 63-01 Metropolitan Ave., Middle Village 79, N. Y.

. . . for more details circle 503, page 73

MOTION PICTURE EQUIPMENT

Sales
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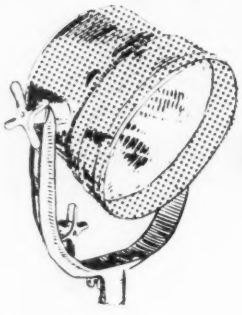
More Light Per Amp
Than Any Other Illumination

MASTERLITE



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Standard Keg Light (5000 Watts)	43 Amps	70 lbs
MASTERLITE	9 Amps	5 lbs
Head With Lamp	$42.50	
Stand	28.75	
Junior Colortran Converter	62.50	
Senior Colortran Converter	98.50	

(Senior Converter will operate 2 Masterlites)

MOTION PICTURE EQUIPMENT

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FREE!

Your Catalog of Complete Motion Picture Equipment and Supplies. This new 1958 catalog is your complete motion picture reference book for

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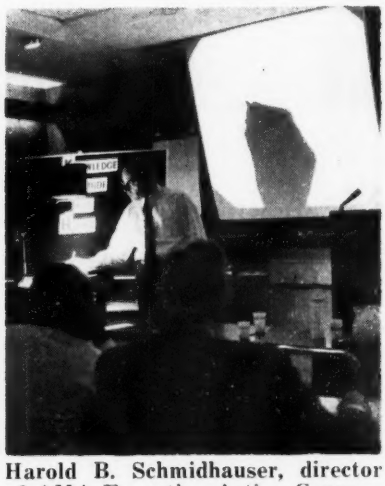
TELEVISION EQUIPMENT COMPANY
161 EAST GRAND AVENUE
CHICAGO 11, ILLINOIS
. . . for more details circle 590, page 73

AMA LECTURE ROOMS EQUIPPED FOR A-V

Lawrence A. Appley, AMA president, lectures from subjects listed on motorized Da-Lite screens.



Harold B. Schmidhauser, director of AMA Executive Action Courses, uses Vuegraph during a session.

To accommodate over 85,000 students every year in courses and seminars of different sizes and durations, the American Management Association has designed special audio-visual aids to permit adapting the same rooms to varied assignments.

One of the larger courses in the curriculum, the Management Course for top and middle industrial executives, is attended by 1000 students each year. It is held in the large auditorium set up in classroom style with rows of tables facing a raised podium. Behind the podium are a chalk board, flannel board, chart pads and, recessed in the ceiling, seven electrically-controlled projection screens.

AMA PREXY LECTURES

Every month the AMA president, Lawrence A. Appley, delivers the opening lecture which sets the stage for the rest of the four-week course. As the material he covers is basically the same for each cycle, during the course of his talk, he relies on a set of standardized visual aids which he controls from a push button panel on the lectern.

One of these aids, a 10x10-foot Da-Lite Electrol projection screen, recessed in the ceiling above the middle of the platform, is lowered into place when a film or slides are to be projected from the booth in the rear of the auditorium.

The format of the course is such that six basic charts listing the concepts and key elements of the class are referred to in this first lecture. These data are silk-screened onto the six smaller Electrol screens located slightly behind the main screen. When lowered these 60x42-inch screens are illuminated by ceiling spotlights and are large enough to be read by a class of 100.

When he reaches a given point in his lecture, the speaker presses the appropriate button and one of the screens is lowered into place. Once the data has been absorbed, if the chart threatens to become a distraction a flick of the lecturer's finger will cause it to recede into the ceiling again. In this way the lecturer has added control of the classroom situation.

SCREEN EQUIPPED ROOMS

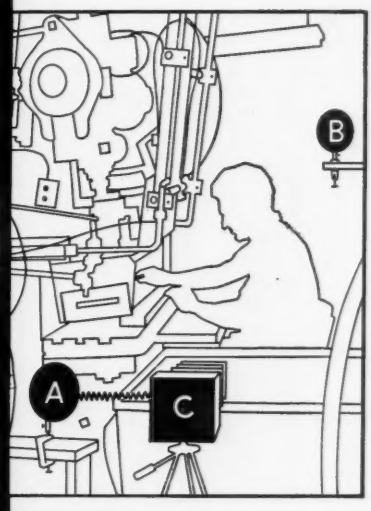
Some 30 additional smaller rooms —AMA's quarters are in New York's Sheraton-Astor Hotel—used for discussion sessions or workshop seminars are equipped with screens which are either recessed in the ceilings or concealed behind wall panels. Projection equipment and tape recorders are brought in from a central location when needed.

To avoid distracting interruptions by technicians, a centrally located sound system is used to control the amplifying setup for each meeting room. The lecturer, however, has at his disposal a simple volume control for fine adjustments.

This central control arrangement also protects the valuable amplifying equipment from mishandling and permits monitoring and tape recording from any room without having to move equipment about.

All of AMA's air conditioned meeting rooms are windowless so that there is no problem of poor projection due to light leakage from outside.

The screens are installed by a contractor and required seven days for installation. Reportedly, many firms are now making similar installations in their A-V rooms. □



Stroboflash II (A) mounted on camera (C) trips Stroboflash II with photoelectric "slave" unit (B) used for back light and to eliminate undesirable shadows on the machine.

STROBOFLASH* slave operation saves time and provides better industrial lighting!

Industrial photos are frequently very difficult to light properly. High ceilings, cramped working space and awkward shadows all handicap the photographer. In addition, it is frequently undesirable or impossible to interrupt a manufacturing operation to be photographed.

Each of these problems can be solved with multiple Stroboflash units and "slave" operation: (1) Two or more Stroboflash units can be tripped in perfect synchronization. (2) Two or more Stroboflash II units give enough light even for action-color. (3) Stroboflash II has a flash duration of 1/1000 second to stop action. (4) By using a simple plug-in photoelectric cell the "slave" lights can be triggered; no extension cords are needed. (5) Stroboflash lampheads can be mounted in inaccessible places and you don't have to climb over obstacles replacing flash lamps for a second or third exposure. (6) The brilliant light output and brief flash duration minimize interference from overhead work lights. (7) The brief flash duration does not blind a machine operator as ordinary flash lamps frequently do.

Here, then, are seven advantages of Stroboflash common to every industrial photo. Many other problems can be solved, depending upon the specific photographic situation.

Illustrated in this ad are the Stroboflash II, $99.50 (less batteries); the Universal Quick Change Clamp, $9.95; and the Photo Tube Assembly, $9.90. Ask your dealer for this combination or write: Dept IP-28. Graflex, Inc., Rochester 3, N. Y., for the complete Stroboflash catalog and price list.

*Trade Mark. *Prices include federal tax where applicable and are subject to change without notice.*

GRAFLEX® *Prize-Winning Cameras and Equipment*

A SUBSIDIARY OF GENERAL PRECISION EQUIPMENT CORPORATION

GPE

. . . for more details circle 542, page 73

At left original drawings are fed into blueprint machine where they are reproduced on Autopositive roll paper. Dry, processed paper leaves other end of machine and lands on cutting table (above) where drawings are cut apart, trimmed and sorted for shipment.

"Exporting" engineering drawings FOR OVERSEAS PLANT

Kaiser-Willys uses Autopositive materials and modified blueprinter to produce transposable copies of intermediate tracings of auto parts.

A special photographic intermediate material that could be exposed and processed continuously was instrumental in helping engineers meet a paperwork deadline when Kaiser-Willys set up its $40 million Argentine plant. It has also paid dividends at the Willys Toledo, Ohio, plant.

The Argentine plant, Industrias Kaiser Argentina, S. A., is the first complete automotive manufacturing operation to be set up in South America. The great bulk of the physical equipment used to create the 40,000-vehicle-a-year plant was taken from surplus facilities in Detroit and Toledo.

ORIGINALS RETAINED

On the paperwork end of engineering, however, the "original equipment" couldn't be shipped abroad. Engineering and design supervision for the entire line of vehicles will be handled out of Toledo, so that the original engineering drawings and intermediates — the tracings from which blueprints are made—must be retained at the home office.

But a set of the intermediates was needed in Argentina for use in making up engineering blueprints there. The problem was finding the best way to produce these duplicate tracings.

Retracing the drawings manually was out of the question from the standpoint of both cost and time. Doing just the most urgent portion of the drawing reproduction work meant copying some 52,000 square feet of tracings in less than two months. Beyond this was the prospect of continually sending to Argentina copies of all changes and corrections in engineering drawings immediately after they were made.

The job of solving the problem was handed to Walter Kunz, supervisor of engineering reproduction for Willys. His first approach was the use of conventional photography, with paper negatives and cloth prints. Time and cost, however, militated against this solution.

CONTINUOUS PROCESSING

Kunz then turned to the special photographic intermediate material—Eastman Kodak's Kodagraph Autopositive Paper—which can be exposed and processed continuously on a standard blueprint machine adapted for the purpose. It can be handled in room light and contact-printed with an original drawing. After processing it will also produce positive reproductions directly, thereby eliminating the negative step.

The Willys Engineering Reproduction department adapted a Revolute M4 blueprint machine for Autopositive processing. The original drawings were fed into

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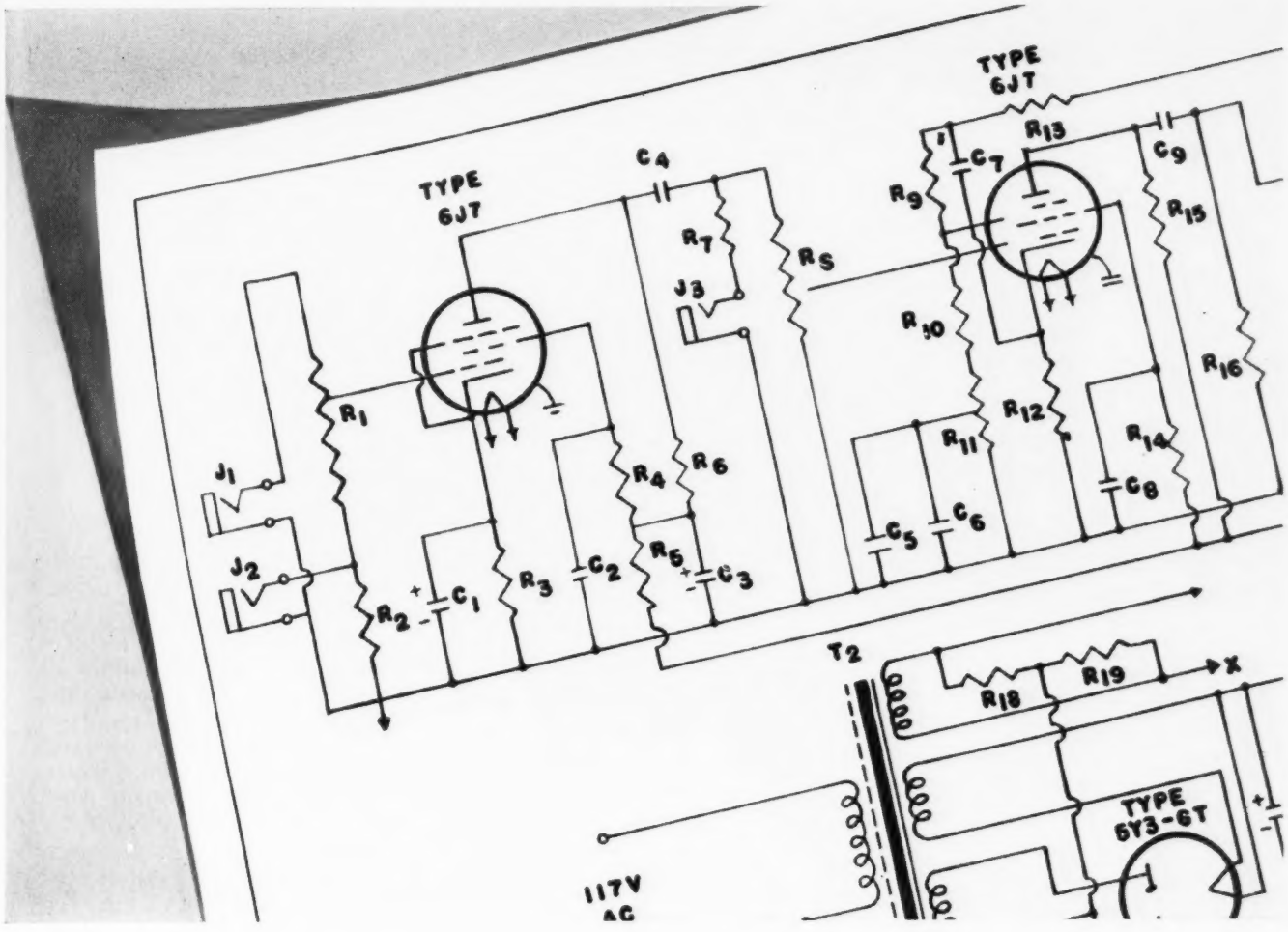

Three users tell why **Cronaflex** is superior

AIRCRAFT MANUFACTURER

Beech Aircraft Corporation, Wichita, Kansas, has found that CRONAFLEX films withstand rough handling and are easy to store. Furthermore, their sharp black-line copies on CRONAFLEX are decidedly better than the gray pencil originals.

COMPONENTS MANUFACTURER

Fisher Governor Company, Marshalltown, Iowa: "We used to have to be very careful with our cloth intermediates because of their fragility and the shrinkage we encountered. When we switched from cloth to CRONAFLEX, with its toughness, stability and easy handling characteristics, we were able to introduce many improved methods in our reproduction work. These methods, made possible by CRONAFLEX, have increased quality and reduced costs."

MAPPING AND REPRODUCTION

Vernon Graphics, Inc., Mt. Vernon, New York: "CRONAFLEX is tough. Its durability and tear strength insure long life for our maps and master file drawings. Because CRONAFLEX is so transparent and dimensionally stable, it is the ideal medium for multi-purpose mapping as well as for blue print and direct process reproduction."

For More Information on how CRONAFLEX Engineering Reproduction Films can work profitably in *your* plant, write to E. I. du Pont de Nemours & Co. (Inc.), Photo Products Department, Wilmington 98, Delaware. In Canada: Du Pont Company of Canada (1956) Limited, Toronto.

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Better Things for Better Living . . . *through Chemistry*

. . . for more details circle 532, page 73

continued from page 71

lighted with this trick. I think you'll like it, once you get used to the idea. I have been trying out the new Super-Angulon lenses for extreme-wide-angle work—and I do mean extreme. They give excellent coverage. The 65mm lens (that's about 2 9/16 inches) covers my 4x5 Deardorff very nicely. Stopped down it even gives me a larger circle of definition. However, a lens as short as this shoved way back into a view camera with normal flexible bellows has the camera so compact that there is not much you can do in the way of movements. By mounting my 65mm Super-Angulon about ¾ of an inch above center (or below if the board is reversed) I gain extra rise and fall movements, and think the Super-Angulon the only answer to those tight interior shots.

Long Lenses

Since this issue of INDUSTRIAL PHOTOGRAPHY contains a directory of long lenses that might be suitable for missile tracking, astrophotography, and the like, I might add some comments on this subject. You probably know that the easiest way to make simple astro pictures is through a telescope. When the telescope is properly focused on the subject, the camera, with lens set at infinity is set to replace the eye at the telescope. This also works nicely with binoculars, and Bushnell, in particular, has made a big thing of selling rigs to enable almost anyone to use a good grade of binocular as a long camera lens. Used with a telescope or binocular, a camera is capable of making good pictures. Obviously the quality and ease of handling may not be as great as an optical system designed especially for astronomical photography, but it is good enough to offer a working tool.

A quick guide to shooting through a telescope is that if the exit pupil of the telescope (Ramsden Disk) is larger than the entrance pupil of the camera lens, the camera lens is then the limiting factor and the effective *f* number of the system is that of the camera. On the other hand, with more powerful 'scopes, the Ramsden Disk may be smaller than that of the camera lens and this limits the *f* stop of the system. To figure out the new *f* system, you divide the diameter of the telescope exit pupil into the focal length of the camera lens to get your effective aperture. For those more interested, there's some good basic data on this in Rudolf Kingslake's excellent book, "Lenses in Photography" (Garden City Publishing Co.).

If you are really interested in astronomical photography you probably know already that the Smithsonian Astrophysical Observatory and the IGY people are working with the Society of Photographic Scientists and Engineers in operation "Photo-track." They are asking technically minded photographers to participate in a program and would like nothing better than to have you photographing one of the artificial satellites with your camera right over one of the U. S. Coast and Geodetic Survey triangulation station markers. They also want a trace interruption coordinated with a time signal broadcast by Station WWW.

The SPSE will not only furnish full information, but will even supply you with a negative for preparation of a clock face to be used for Photo-Chronographic recording. Thanks to Giles Wilkinson of the Recordak Corporation in Washington, D. C., all participating are being furnished with an *original* Recordak negative of the clock-face designed by the IGY people. If you want more interesting data on this subject, write to Morton Goodwin, Sec'y.-Treas., SPSE, 826 Connecticut Ave., N.W., Washington 6, D. C.

"A salesman left it. Said to try it the next time we need to light a large area."

Sputnik-Streaks

If you are not really an astronomer at heart and just want to make pictures of Sputnik-streaks for fun—or to impress your boss—I have seen a number of excellent pictures showing the trail of Sputnik I's rocket. They were made just at dusk when the sky was dark, but there was enough sunlight to illuminate the flying object. Friends who have made such pictures had good results by opening a tripod mounted camera for 5 to 15 seconds and shooting at *f*/2.5 on 35mm Tri-X film. With the superfast Royal-X you can shoot even faster, and excellent movies have also been made when the camera has been mounted on a head suitable for smooth tracking. With movie camera rigid, streaks can be recorded.

Looking through my notebooks for interesting astronomical data, I have come across several bits of miscellanea you might want to jot down. If you are photographing the moon for inclusion in a night shot, or just for fun making pictures through one of the long lenses or telescopes you've acquired (we hope through our Directory of Long Lenses), you might be interested in some basic exposures I have recorded as a guide. Peter Leavens, the noted astronomical photographer, has given the following data for photographing the moon with film of an ASA 100 index.

Crescent	1/50 at *f* 5.6
Quarter	1/50 at *f* 8.
Gibbous (¾)	1/50 at *f* 11.
Full	1/50 at *f* 16.

If you want to make pictures

continued on page 50

Photo of a barge unloading at Port Sulphur, Louisiana, by O. Winston Link . . .
taken with 20 Sylvania No. 2 flashbulbs at 1/100th of a second.

It's a better picture because . . .

. . . it's a flash picture!

ONLY FLASHBULBS can give you dramatically detailed night shots like this so conveniently and dependably! They provide light that's controlled and penetrating to provide quality picture-taking results.

You can always count on superior photographic results when you use Sylvania flashbulbs. Their difference lies in these exclusive advantages.

- Mobility of lightweight equipment.
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- Accurately measurable light that follows the law of inverse squares.
- Intense, instantaneous light source.

On your next assignment . . . and for every assignment . . . use Sylvania Flashbulbs and Superflood lamps. Their consistent and superior performance has made them the first-choice preference of professional and industrial photographers everywhere!

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Shell Tower Building, Montreal

SYLVANIA

. . . outsells all other flashbulbs combined

LIGHTING • TELEVISION • RADIO • ELECTRONICS • PHOTOGRAPHY • ATOMIC ENERGY • METALS & CHEMICALS

. . . for more details circle 586, page 73

NEW EQUIPMENT

continued from page 15

FPC 42-1 Film **115**

Ansco is marketing a new FPC 42-1 blue sensitive recording film for airborne recording and rapid processing of radarscope linescan presentations. Peak sensitivity is at 3700 A.U. visible light response, with 100 lines per mm. The film is available in 70mm x 100′, 5″ x 100′ and 9½″ x 100′ rolls.

Plate Master **116**

Photostat Corp. introduces the Photostat Plate Master package which utilizes a new method of photo offset reproduction to produce up to 200 plates daily. Included in the package are a camera, a 6-foot production section with negative washer and drier. A darkroom is not necessary with the unit to copy originals to 17 x 22″ and finished images to 8⅜ x 10⅞″. Eight minutes are required for the first copy processed, with about two minutes each for successive copies. Price of the complete unit is set at $3,375.

BECCO Etching Process **117**

Becco Chemical Corp. announces a new process for etching printed circuits, employing as the etchant an aqueous ammonium persulfate solution. Advantages are said to be that the new solution may be used for etching all types of circuits, that sludge formation is avoided and that the etchant is relatively non-corrosive.

MT/O 35 Microfilm Camera 118

A 35mm microfilm planetary camera for high-speed production is announced by *Ozalid* to provide automatic exposure control of voltage and density. The new unit includes a high-speed motorized, canted column with a light-proof cut-off magazine. The camera is either foot or hand operated. A 40 x 60″ copy table accommodates drawings through Size E. Various accessories and a 16mm conversion unit are available.

Projector Stand/Cabinet **119**

A new steel projector stand and cabinet is announced by *Century Engineering Corp.* The steel top will accommodate the projector while the lower area with two sliding drawers will hold 26 reels of 8mm or 14 of 16mm. The overall size is 11″ x 17″ x 24½″. Price: $39.75.

New Cronaflex Film **120**

A clear, unmatted direct positive film has been added to *DuPont's* Cronaflex line of engineering films. The new film has been developed for mapping, surveying and engineering reproduction jobs.

FLAT **121**

FLAT, a new print flattening solution which is said to stabilize print paper molecules against dimensional changes, is announced by *The Upson Chemical Corporation.* FLAT is said to prevent print curl in that the solution penetrates the paper, rather than imparting a brittle coating on the glossy, emulsion side.

Small Film Drier **122**

Oscar Fisher Co., Inc., has developed a rapid, automatic film drier which requires but 11 x 18″ of lab space. Capacity is 12 8 x 10s, 24 4 x 5s or 15 feet of 35mm film. Drying time is reported to be 10 minutes with a Calrod heat element and a high-velocity blower. The stainless steel unit is 36″ high and operates on 110V, 60 cycle, AC current.

Three-dimensional Titles **123**

Movitex, a plastic titling kit for still and motion pictures, is announced by *Pryor Marking Products.* Made in a wide range of sizes and colors, the new medium is inserted into a plastic, perforated background for contrast and mounting.

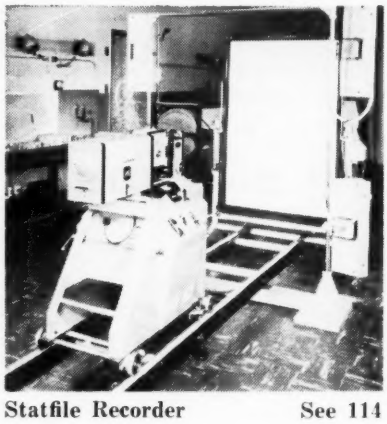
Pakotanks **124**

Pako Corp. has developed 25 and 50-gallon high-impact plastic storage tanks which include drains, covers and an external sight gauge. The plastic material is said to be inert to processing materials. Metal stands are also available for gravity-flow systems.

SO-1218 Color Film **125**

Kodak has announced SO-1218 high-speed negative color film for specialized uses. One major feature of the new film is its high contrast. It is rated with an ASA of 200, but under certain conditions it is said to be as high as 800. Processing is with conventional solutions such as those for Kodacolor.

continued on page 49



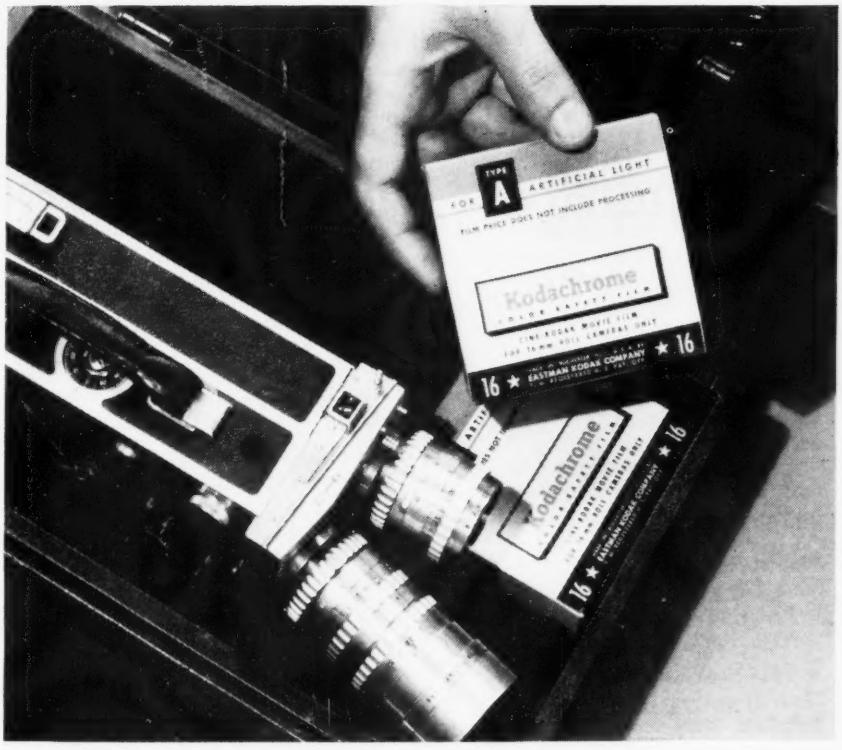
Statfile Recorder See 114

Microfilm Camera See 118

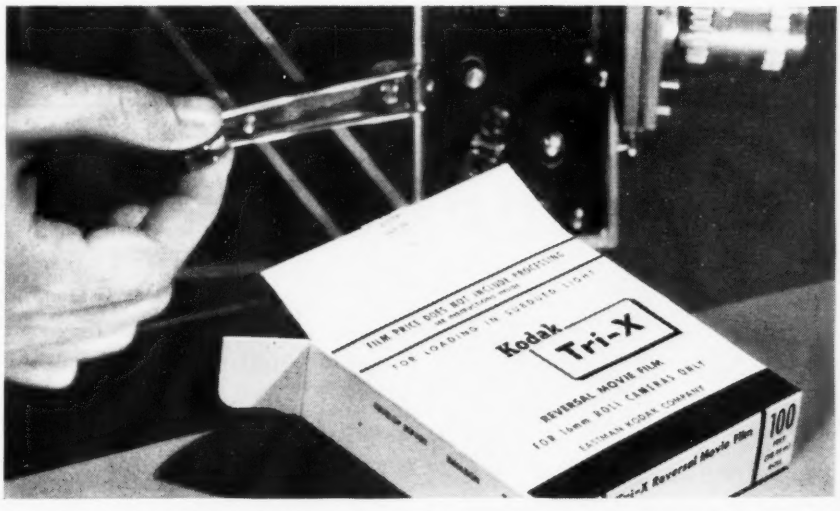
Projector Stand See 119

Pakotanks See 124

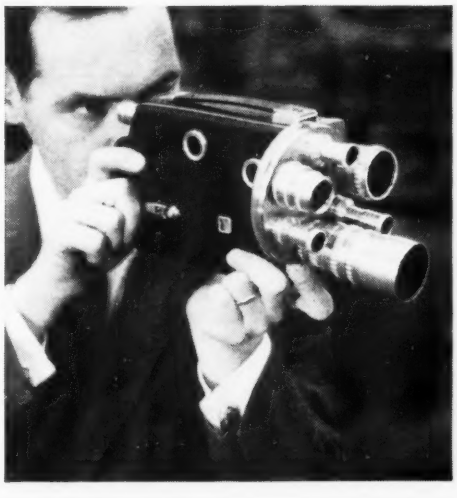
KODAK FILMS FOR INDUSTRY



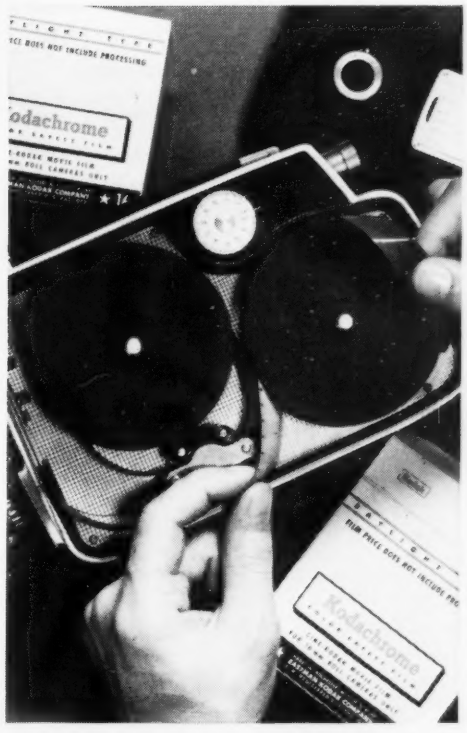
Shooting a sales film in color? In plant or studio with artificial lighting, Type A Kodachrome Film is balanced for best color rendition.



Shooting in the rain, or inside with existing light? Then you'll want the high speed of Kodak Tri-X Reversal Film. Grain is moderate.



Producing a how-to-do-it film in your studio? Where lighting is ample, the fine grain and medium speed of Kodak Plus-X Reversal Film give you optimum image quality.



Making a public relations movie in the field? Daylight Type Kodachrome Film gives richness and brilliance to any motion picture story.

One minute you're in the board room making movies of the president for an employee relations program. Then off you go to the factory for some time studies for plant engineering. And you're apt to end up on the water tower, coat-tails flapping in the breeze, while you shoot "aerial views" of the plant.

When your jobs are as varied as this, it's good to know that Kodak makes the films you need. There are some 30 dependable Kodak 16mm Movie Films in all. Your dealer handles most of them, can special-order the rest. And on special problems, you have personal contact with Kodak through your technical representative, whose job is to help.

See back cover of this magazine for story on Kodak K-100 Turret Camera.

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Related Reading

How to Animate Cut-outs

by C. H. Barton, Focal Press, New York, 116 pp.

There has been a great need for a complete and thorough book on animation to be written in English. Although this is by no means a definitive work, and is intended mainly for amateur films, it is nonetheless an excellent volume for the industrial producer who may be interested in cartoon animation or simple animation effects for titling.

The figures discussed here are, for the most part, cardboard cut-outs. Yet, cartoon-like, they can be made to perform and appear in relation to a background for simple effects almost as satisfactorily as multi-plane animation stands. The beauty of the book is the simplicity with which it is written for the home movie fan. Yet there are keys for scripting, special effects such as smoke, explosions, and titling effects.

For anyone who makes his own training films, or for in-plant photography—this has some cute ideas.

Photo-Vision

by Ray Bethers, St. Martin's Press, Inc., dist. by Amphoto, New York, 106 pp., $4.95.

This book is founded on a series that appeared in 1955-1956 in the English fan magazine *Photography*. It contains 12 lessons, freely illustrated by photographs and drawings and is intended to show the reader how to see "creatively." The author—a writer, painter and art editor—assumes that the ability to operate a camera is already known. Typical lessons, which also include photographic projects so theory may be combined with practice, deal with abstract shapes, dark and light values, use of textures, flat pattern, pictorial space and the effects on the picture of horizontals, verticals, rectangles, diagonals and triangles.

Technical Report Writing

by James W. Souther. John Wiley & Sons, Inc., 70 pp., $2.95.

Industrial technicians who occasionally write a technical report will come to rely on this handbook as an excellent if abridged reference. It helps the lay writer analyze the need for and the use of his report, coordinate pertinent data and select the important from the extraneous. It shows how research material is gathered, classified, reported and written.

Included are examples depicting how and when to use graphs, charts, and full- and half-tone cuts.

From the photo industry point of view, it is regrettable that the chapter on "Reproduction Processes" is given so little space. Edward Sanford, Ryan Aeronautical Co., contributed this important section, altogether too brief. □

Filmline PERFORMS BEST

...at FILM ASSOCIATES, DAYTON, OHIO

E. Ray Arn, president of Film Associates, (with more than a decade of experience in continuous film processing) has this to say about his Filmline R-90 processor:*

"Now that we have over a year of service with almost two million feet of reversal film processed, I feel I can give you a good picture of our feeling regarding our Filmline processor. It is a pleasure to run day after day without keeping our fingers crossed. Our other self-contained processor was a continual headache, in troubles with clutches, bad rollers, and rising elevators. We have found with other processors we've owned in the past, that troubles usually begin after four to six months of service.
You are to be commended on your fine products, and you may rest assured that we are most happy with, and most heartily endorse Filmline processors."

Illustrated: Filmline Model R-90. 16mm Reversal & Negative/positive processor. Speeds to 90 feet per minute. Completely equipped $14,800.00

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. . . for more details circle 536, page 73

Filmline

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NEW EQUIPMENT

continued from page 46

TC 2211 Temp Control **126**

Oscar Fisher Co., Inc. announces its Model TC 2211 automatic temperature control system. It requires 13″ x 11½″ x 3″ for the complete unit, including a stainless steel case. It is designed specifically for color and b&w processing line controls, providing temp control to ¼° accuracy.

N-9 100′ Magazine **127**

A 100-foot magazine, designed specifically for the Bell & Howell N-9 16mm camera is announced by *Traid Corp.* No modification to the camera is required. A heater and thermostat is included, permitting operations from 65-165°F. Dimensions are 3 23/32 (height), 7 23/64 (length) and 1 1/16″ (thick).

Stainless Dispensing Faucet **128**

Eco Engineering Co. has introduced their new corrosion-resistant faucet of stainless steel. The faucet provides both fluid and vapor-tight seals over a wide temperature range. It is available in two sections so that the dispensing end may be removed while the shank remains as a permanent installation in the drum. Shanks are supplied with interchangeable sizes of ⅜″, ¾″ and ½″ with tapered threads.

Slide Mounter **129**

Seary-Michelbach Corp. has developed an automatic slide mounter which reportedly operates at about four times the speed of manual mounters. Complete with automatic sequence numbering, the new model uses either medium or standard grade card mounts and features a self-feeding film train. Standing about desk-high, it takes 3 x 5′ floor space.

Electro-Rex **130**

Rex-Rotary Distributing Co. announces an electronic stencil cutter which scans such copy as stencils, plates, screened photo prints, etc., and then converts the images to a high-frequency circuit which in turn transposes it to a cutting stylus and the mimeo stencil. It is reported that the scanning definition from 125 to 750 lines per inch provides a wide tone scale from black to white. The stencils are reproduced on a standard mimeo machine utilizing any of the standard mimeographing processes.

continued on page 51

FLAT . . . a new

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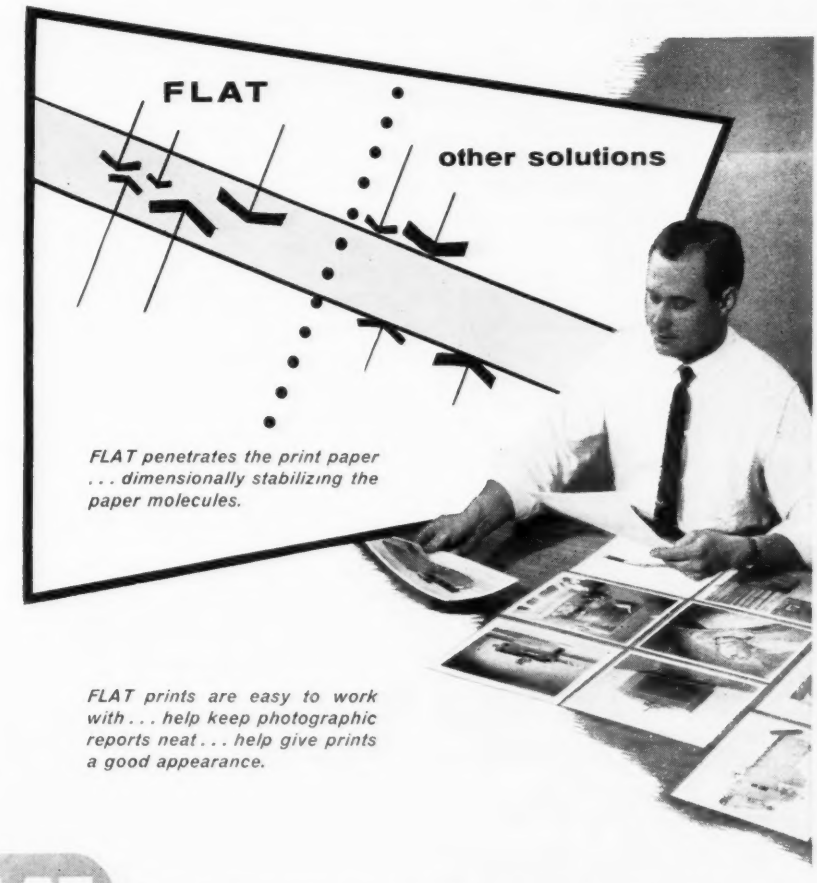
employing the new theory of fibre permanamics



FLAT penetrates the print paper . . . dimensionally stabilizing the paper molecules.

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LOCKPORT, NEW YORK

. . . for more details circle 594, page 73

continued from page 44

of earth-bound subjects by moonlight, you may want to put this data in your notebook. Al Gescheidt, a fellow ASMP member, passed this data on to the ambitious photographer:

A full moon reflects back to earth about 1/100,000th of the power of normal sunlight. For a moderately slow film, if you assume a daylight exposure of *f*/8 at 1/100th, this means that on a full moon night you must expose about 16 minutes to get a picture that looks like daylight. Inasmuch as you do not want this much exposure if you want your pictures to look like they are moonlight rather than sunlight, here are some guides for moonlight pictures, assuming the moon is full.

Film	*Exposure*	
Kodachrome	*f* 2	2 min.
	f 2.8	4 min.
	f 4	8 min.
	f 5.6	15 min.
	f 8	30 min.
	f 11	60 min.

Film	*Exposure*	
Plus-x	*f* 2	15 sec.
	f 2.8	30 sec.
	f 4	1 min.
	f 5.6	2 min.
	f 8	4 min.
	f 11	8 min.

Film	*Exposure*	
Anscochrome and Ektachrome	*f* 2	30 sec.
	f 2.8	1 min.
	f 4	2 min.
	f 5.6	4 min.
	f 8	8 min.
	f 11	15 min.

Film	*Exposure*	
Super Anscochrome	*f* 2	8 sec.
	f 2.8	15 sec.
	f 4	30 sec.
	f 5.6	1 min.
	f 8	2 min.
	f 11	4 min.

Note: These are for pictures of *landscapes* lighted by the moon and *not* for pictures of the moon itself. These exposures are for *full* moon. On the day before or after full moon add 30 per cent. Two days before or after full moon, add 50 per cent.

Night Effects

Although the above gives you a fine excuse for being out on moonlight nights, it is sometimes easier to shoot for night effects in the daytime. Infrared film is a good bet here, and is often used in Hollywood for this purpose. Harrison and Harrison provide filters for black and white photography that give effects from strong moonlight, to weak moonlight, twilight, and night through the use of various strengths of red, yellow, or green filters, normal or under exposure, and control of contrast in development. These are listed in "Photo-Lab-Index," or Harrison and Harrison of Hollywood will send you data. Sometimes it's easier than working with a flashlight at night! □

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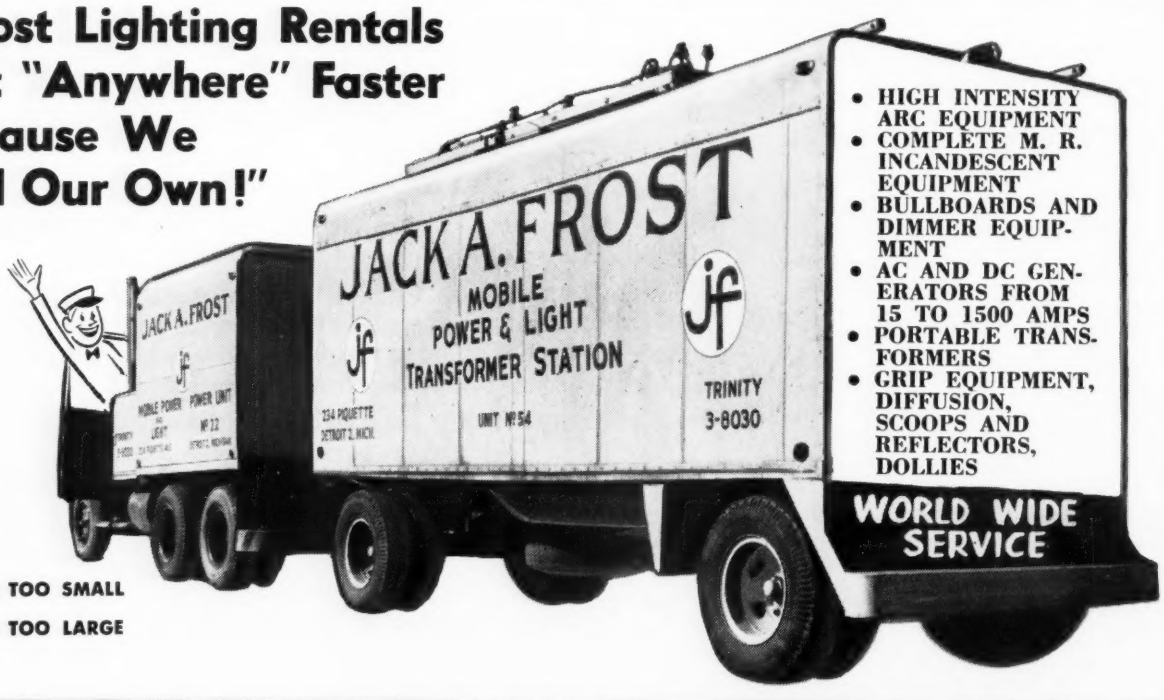

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. . . for more details circle 538, page 73

NEW EQUIPMENT

continued from page 49

Royal Super 35mm Camera 131

The Royal Super 35mm Camera, imported by *Burke & James, Inc.*, with a five element f/2.8 50mm Tominor Lens is said to focus from two feet to infinity. Other features include single stroke film transport, prismatic rangefinder and standard tripod sprocket. List price with lens, $59.95.

New Screens 132

Da-Lite Screen Company has announced a new screen, the "Pacer," an automatic push-button unit available in eight models. Pressing one button causes the legs of the tripod to automatically glide open and set in place. List prices from $18.50 for a 30" x 40" to $45.00 for a 70" x 70" screen.

Bright-Light Photocopy Paper 133

An improved "Bright-Lite" No. 1 negative paper for DRI-STAT silver-transfer process photocopying has been introduced by *Peerless Photo Products, Inc.* The emulsion of the new paper has been modified to reduce fogging and increase the handling latitude.

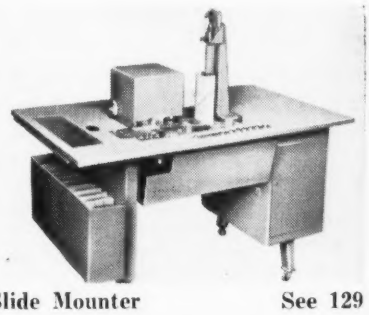
6-6 Portable Projector 134

A double optical system is incorporated in the redesigned FerColor 6-6 Projector being distributed by the *Buttafarri Corp.* With the system a 3x3-foot image is projected at a distance of four feet. The unit also has a 12"x12" built-in screen, with a total weight of 11 pounds. Price with a 57mm f2.8 SOM-Berthoit lens is listed at $149.50.

Photographic Fixative 135

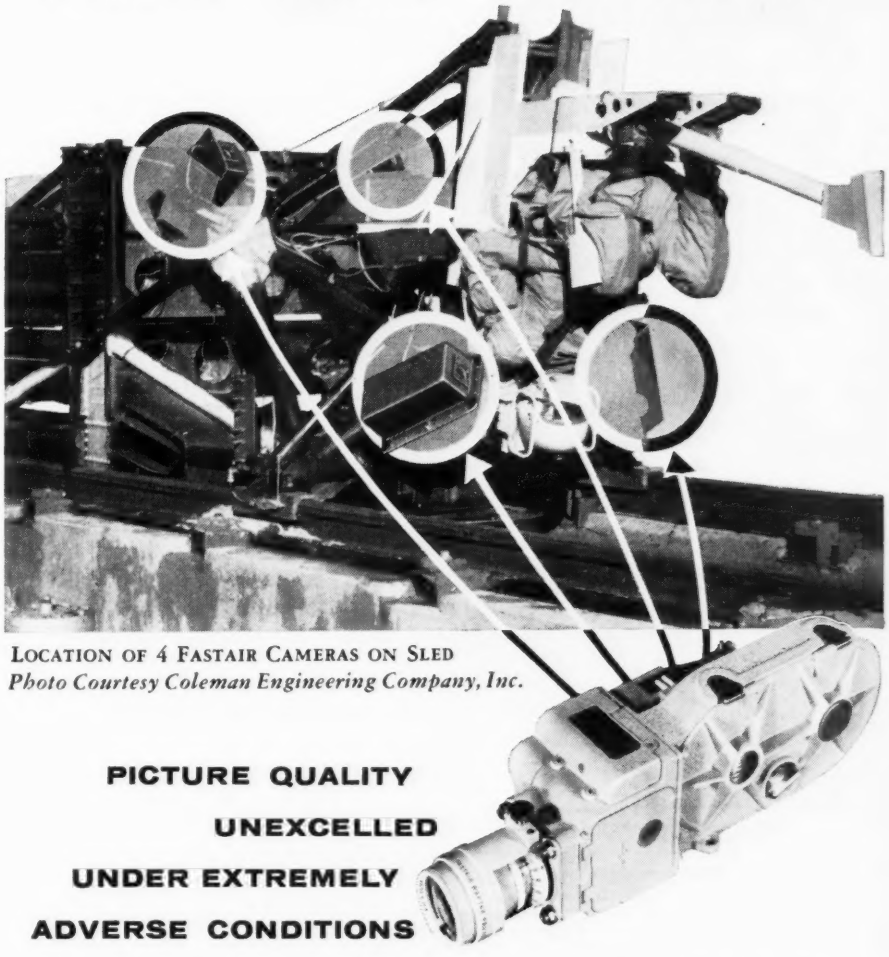
Pro-Tek-To Spray, produced by *John G. Marshall Mfg. Co., Inc.*, is a new photo fixer to eliminate unwanted glare and reflection from glossy and matte photos. The spray is claimed to dry in seconds and is odorless.

continued on page 55



Slide Mounter See 129

4 FASTAIR CAMERAS RECORD ROCKET SLED TEST...



LOCATION OF 4 FASTAIR CAMERAS ON SLED
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Photo Unit Supervisor, Lockheed Missile Systems Divisions, Palo Alto, California

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. . . for more details circle 598, page 73

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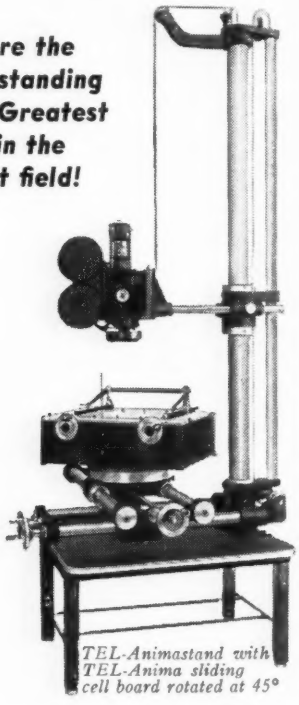

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. . . for more details circle 582, page 73

MOVIE CLINIC: Technicians on Techniques

ANIMATION IN COMPANY INDUSTRIAL FILMS: PART ONE

by DON McCORMICK
McCormick-Wade Animation

The relative neglect of animation in corporate selling, instructional and institutional motion pictures is partly due to lack of knowledge of what animation does so superbly well, and partly to miscomprehensions of what the large term "animation" means.

Mention "animation" to the average industrial film prospect and he will think of the techniques used in "Cinderella" and "Snow White." Tell him that highly successful animated motion pictures have been made with no figure movement at all, and he will be amazed. "Omnibus" recently featured a fifteen minute *animated* film about Manolete, the bull-fighter, in which all movement was done by the camera as it skilfully moved into, moved away from, or moved across a wonderful series of drawings and photographs.

Between the extremes of complex, "full" animation with with elaborate backgrounds, and animation in which all the movement is done by the camera are many techniques differing greatly in their audience effect, and widely disparate as to cost.

Cost Bugaboo

Cost! That's usually the bugaboo when animation is mentioned. But animation can cost less than live photography, much less.

Let's leave that provocative statement alone for a moment while we consider why animation, by itself, or in support of live photography, can add so much to the industrial film.

Animation can express many concepts more quickly and much more understandably than any other medium. Take the familiar explanatory animation of "how it works." Nothing can so readily explain the essential workings of complicated machinery as animation. If the Chinese philosopher who made the famous observation about how many words a picture is worth had been familiar with animation, he would have upped his estimate to a million. Another very familiar use of animation is in the various ways in which comparisons can be made; ra-

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. . . for more details circle 603, page 73

tios of this to that which presented in any other way would be difficult to grasp if not downright mentally indigestible.

A basic reason why animation is so effective is a psychological one. The devices used in animation are not real. They are symbols.

In our civilization, we are deeply affected by symbols. From childhood, we are exposed to symbols of all kinds—the kiss, the handshake, Santa Claus, the symbols of religion and of all the conventions of society. Visual symbols are such a part of our lives that we do not recognize them as such—the stylized heart, the ogre and witch, the directional arrow. We write with a symbol of our speech; we express abstract ideas through the symbols of mathematics. Small wonder, then, that the animated symbols effect us so.

Symbolic Wooliness

The celebrated "Harry and Bert" television commercials, production of which the author supervised, illustrate this very well. Their symbolic portrayal of wooliness in thought and fustiness in character made these commercials wildly funny in a way live action photography could never have done.

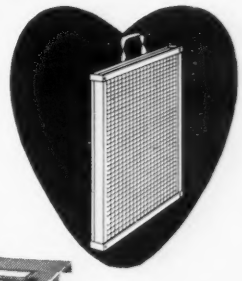
We have spoken of the very elementary use of animation to show "how it works" or to provide graphic comparisons. These conventional uses of animation in corporate films, however, are often merely expedients. Not knowing what else to do with a mechanical or abstract concept, company films "fall back" on animation.

A more sophisticated approach to industrial films would be to include the possibility of using animation when ever animation can put across *any* concept better than live action photography can.

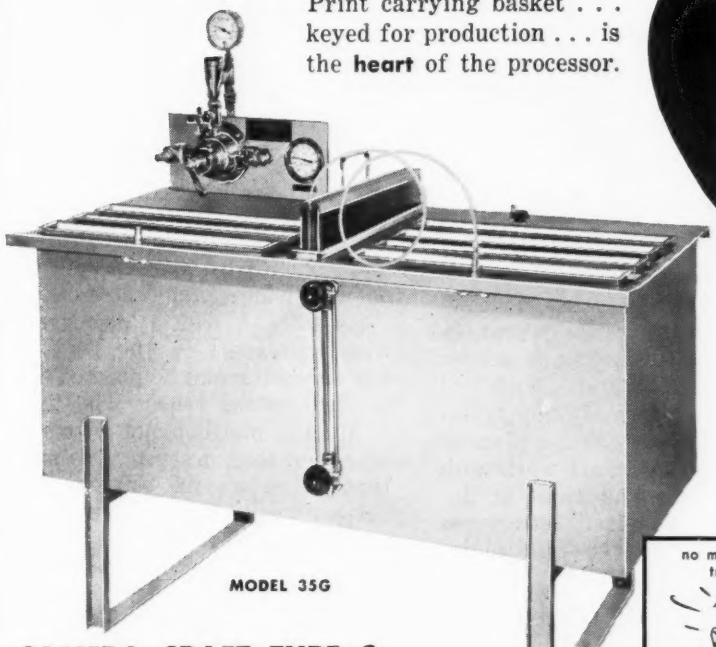
Suppose your film is about a tractor; suppose you have a number of points to get across about your tractor. Live photography of a new, bright tractor in a beautiful rural setting would be fine—for a while. But how long can watching a tractor work keep your attention?

continued on page 66

NEW 3½ GALLON TYPE C PROCESSOR DEVELOPS ALL SIZES up to 16 x 20!



Print carrying basket . . . keyed for production . . . is the **heart** of the processor.



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. . . for more details circle 520, page 73

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Graphic Viewpoints

by EARL STANTON

SILK SCREEN REPRODUCTION USES NEW MATERIALS

Silk screen reproduction is one subject which I have not yet found time to write about in this column. Surely silk screen reproduction is in the same bed with reproduction of other types. Whether we reproduce a piece of printed matter or art work with silk, squeegee and paint or duplicate it by offset, letterpress or xerography it is still reproduction.

Silk screen reproduction is not new but some of the materials being introduced are worth passing along. Those using this technique may find some of my suggestions helpful or just "old hat."

Handcut stencils for the silk screen industry are probably one reason why the technique has never gained the popularity it deserves. Hand cutting is costly and requires an artist when fine details are involved.

I think, however, that with new photographic materials now commercially available to make the very finest detailed screens, the technique should within a few years come into its own. Our world is changing fast and one has all he can do to keep up with the change of pace set since the late 1940's—especially in the graphic arts and reproduction fields.

I have often wondered why silk screen reproduction never reached out to the thousands of potential users and interested industrial plants in initiating a small silk screen operation. Just about every industrial firm has need for silk screen reproduction although many industrial firms probably do not realize what can be done with this form of reproduction. The use of photography in making silk screen stencils is not new and it's a mystery to me why more people do not use photographic stencils.

Recently I had a discussion with an expert in the field of silk screening and he pointed out one interesting reason why photo stencils had not met with the reception they deserve. He said that often a silk screen user needs a heavy screen in order to lay down enough paint to reproduce on a crinkled surface. Standard photo type screens made on photo stencil film are not heavy enough to furnish the thickness of paint necessary to screen on a crinkled or uneven surface. The photo stencil films made by Kodak and Du Pont are excellent for the average screen job and I have found that if the manufacturer's data sheets are followed little trouble is encountered. However, I have also found that problems do occur with the photo stencil film when the object to be screened has a deep crinkled surface.

Thick Stencil Necessary

It's absolutely necessary to have a thicker stencil than is possible with any of the photo stencils I have found or used. This same problem holds true with the pigment paper stencil which the user has to sensitize in ammonium dichromate, attach to a temporary support and prepare for laying down on the silk. I think that any of the photo stencil films or the pigment papers are excellent but can't always fill the bill.

One type of photo stencil which I have found very easy to use and leaves the operator with the choice of determining how thick a stencil he wants or needs is a relatively new material called Photoseal. Photoseal is a two step process. The base comes separately and is mixed with the sensitizing agent prior to application.

It's easy to use. The emulsion is coated directly onto the silk, air dried, printed and washed out to form the permanent silk screen stencil. It's tough and almost impossible to damage once the positive has been printed down and washed out with either cold or lukewarm water. I recently saw a screen which is two years old, has extremely fine detail and has not been pampered. The stencil is as good now as the day it was made.

One advantage I find with Photoseal is this: if you decide that you need an emulsion or stencil with 6 mils or 9 mils thickness it's easy to make. A special applicator is used with this emulsion which lays down a coat of base just 3 mils thick. To make a screen with a 9-mil build-up you coat three applications on the screen. First, 3 mils, let dry, recoat and then recoat the third time. Any thickness stencil you want or need is possible.

The emulsion is fast. There is no stripping off of a temporary support. Actually it is my idea that one is able to make as fine a detailed screen with this material as any artist could hand cut. If you have never tried this material I am sure you are in for a treat when you do.

I do not want to convey the idea to any reader that this direct emulsion is the "best." Photo stencil films are excellent and have a wide application and need. I do think that when an operator needs to make a stencil for a job where the photo stencil film must be thicker than average, Photoseal is an easy way out.

No matter what product is developed and proven many operators will continue to hand cut their stencils. I do not attempt to convert anyone through this column but just mention new and better techniques when I find them in the hope they will be useful.

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NEW EQUIPMENT

continued from page 51

Contoura-Matic **136**

A plastic cartridge of premixed processing developer is the salient feature of the new Contoura-Matic photocopier announced by *F. G. Ludwig, Inc.* Small (15 x 6"), light (12 lbs.), the new model turns out copies at the rate of four a minute. The developer is changed simply by exchanging the plastic developer bag. List price: $189.

Airborne Camera **137**

A new airborne camera system is announced by *Traid Corp.* to photograph aircraft exterior surfaces and components. A clear plastic dome is mounted over a 24-inch base plate onto which several different motion picture camera types may be adapted. Space is provided for fully automatic controls. Said to be low in drag, the unit is about eight inches high and, completely fitted, weighs about 35 pounds.

Butt-Splicing Blocks **138**

A new device for butt splicing 16mm and 35mm film has just been released by *Florman & Babb, Inc.* The film is registered over a set of sprocket pins and cut. Magic Mylar Sprocketed Transparent Splicing Tape is placed on the block, adhesive side up. The film is then lowered onto the tape. Butt splicing blocks are available in four models from $9.50 to $24.50.

16mm to 8mm Adapter Ring **139**

Development of new Bolex adapter ring by *Paillard, Inc.* permits connecting 16mm extension tubes to all 8mm movie cameras with standard ASA "D" mounts. By coupling tubes to 8mm telephoto lens, frame of film can be filled by subject as small as 3/16" x ⅛". Set of tubes consists of special adapter, two extension tubes and standard adapter. Price is $14 set.

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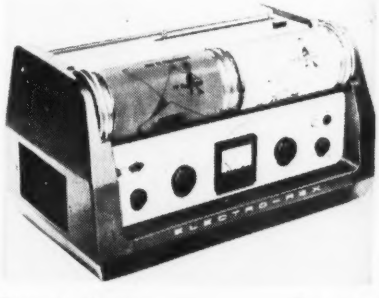

Stencil Cutter See 130

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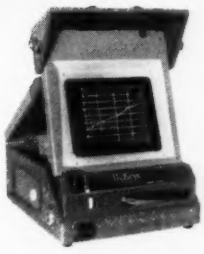

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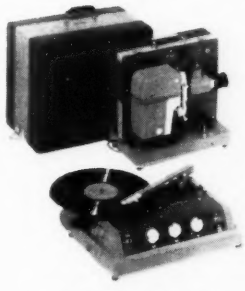

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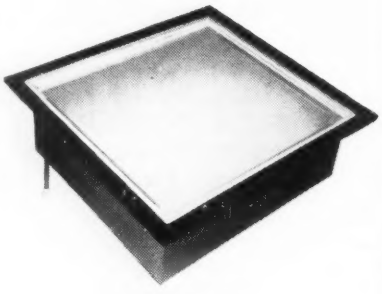

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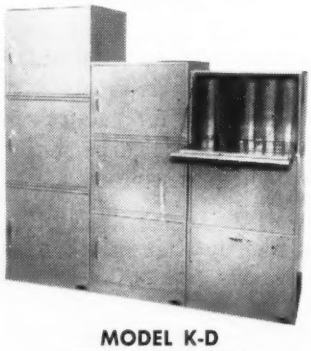

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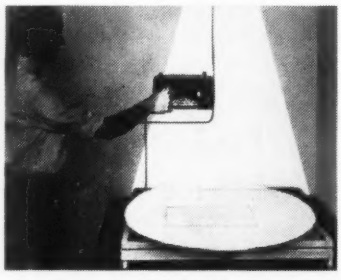

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NEW EQUIPMENT

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Vinyl Plastic Work Aprons 140

Vinyl plastic-coated work aprons are now available for photo laboratory technicians from the *Leshner Corporation.* Specially calendered cotton cloth is coated four-ply on "wear" side plus single coat on reverse side for protection against acids, alkalies, oils and solvents. Colors are black, white, yellow and silver, sizes 27 x 32 and 32 x 45, prices $1.50 and $2.00.

All-in-One Lens 141

The Alpa-Makro-Kilar 40mm *f*/2.8 lens with preset diaphragm is now available for the Swiss Alpa 35mm single-lens reflex camera from *Karl Heitz, Inc.* With an extreme extension range of the lens mount, the lens focuses from infinity down to 4″ on the Model E or to 2″ on the Model D. Calibration on the lens are distances, exposure factors and subject-to-negative ratios of up to 1:2 or 1:1. Price: Model E, $119.50; Model D, $139.50.

Kodak Film Cleaner 142

Kodak announces a new film cleaner for b&w and color negatives. Non-flammable, it is applied with a lintless cloth. Price: 90 cents, four-ounce bottle.

Light Bar 144

Flex Electric Products introduces a new four bulb light bar, Mobilite 500. It features push button light control — four buttons for dim, brite, extra brite and off — as well as an exposure guide on the control panel. Mobilite 500 uses 375 watt bulbs and retails for $11.95.

Hasselblad Adapter Ring 145

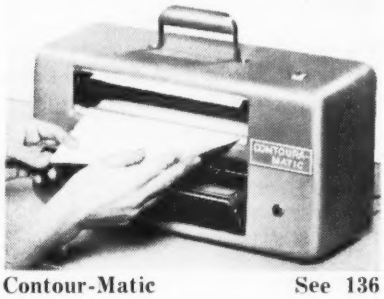
Tiffen Marketing Co. announces the introduction of a Tiffen Bayonet Adapter Ring #820 for the new Hasselblad #500-C camera. It fits all Hasselblad lenses and takes regular #8 filters as well as all standard accessories. Retails at $6.50.

Heat Controlled Projector 146

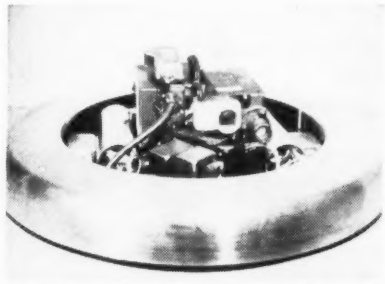
The new Thermo-Gard automatic 2x2 slide projector currently being marketed by *Viewlex Inc.* is equipped with a thermostatic control which reportedly assures low, even temperatures at the film plane. When heat builds up in the projector body from the projection lamp the device cuts off the power. Price, $119.50.

Fold Up Flash Unit 147

A pocket-size flash unit that offers the features of conventional models has been introduced by the *Heiland Division* of Minneapolis-Honeywell Regulator Co. Known as Tilt-A-Mite, it takes either M-2 or standard bulbs, features a fan-

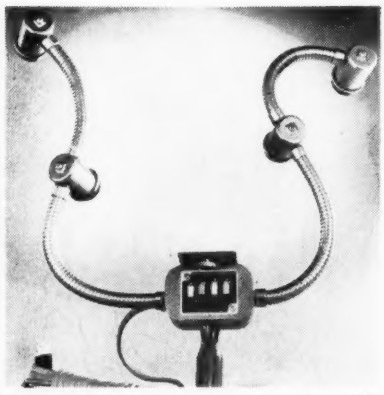


Contour-Matic See 136



Airborne Camera See 137

All-in-One Lens See 141



Light Bar See 144

folding reflector, a B-C circuit, test light and bulb-ejector button. Unit is priced at $11.95.

No. 57 Calculator 148

The No. 57 Proportioning Calculator for camera, platemaking, design and art sections is announced by *Robertson Photo Mechanix, Inc.* The slide rule type calculator is made of annodized aluminum. Twenty inches long, one edge is marked in inches, the other in both inches and picas. The scale is calibrated in percentages and the Robertson Arbitrary System. Price is $20.

Magnifying Eyeglasses 149

"Telesight" eyeglasses to relieve eyestrain while doing retouching or other close-up work are available from *William Dixon, Inc.*, Either to hook on over regular glasses or with frames, the visual aids come in 14, 11, 9 and 7-inch focal ranges and have a hinged movement to permit flipping them out of range when not in use. Weight is about 1 oz.

180mm, f/5.5 Telemegor Lens 150

The five-element, 180mm, *f*/5.5 Meyer Gorlitz Telemegor telephoto lens is available for Praktina and Praktica cameras from *Standard Camera Corp.* It is sup-

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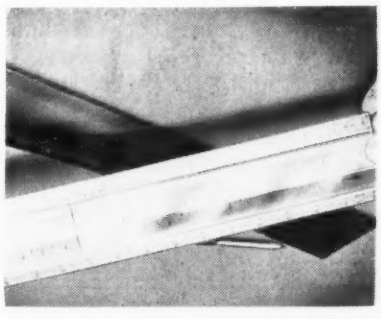

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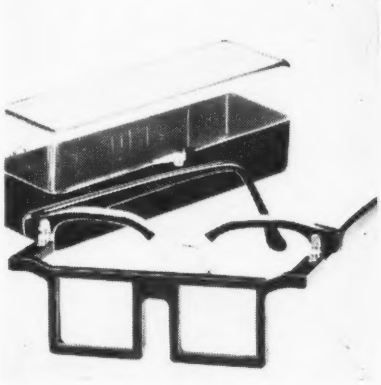
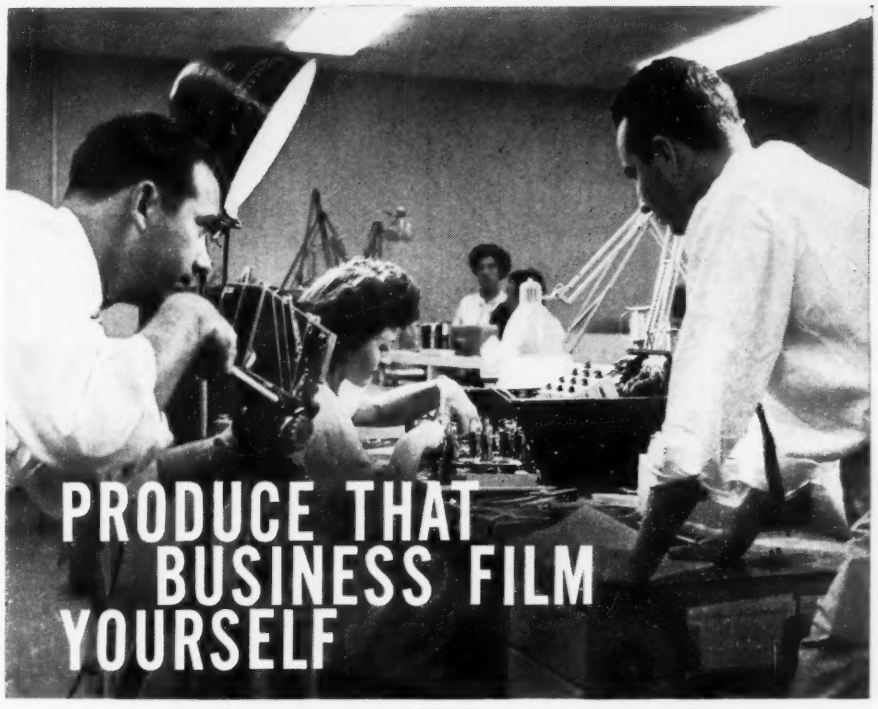


"Telesight" Glasses See 149



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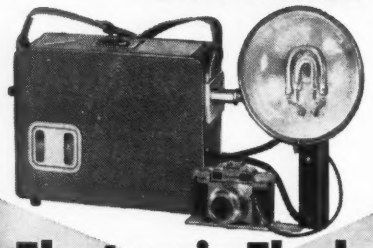

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As Others See It

by LLOYD E. VARDEN

REVIEW OF PROGRESS IN PHOTOGRAPHIC MATERIALS AND PROCESSES

A short time ago I received a complimentary reprint of a chapter from *Reports on the Progress of Applied Chemistry*, entitled "Photographic Materials and Processes," published by the Society of Chemical Industry, London, England. The authors are G. C. Farnell, G. I. P. Levenson and F. Pollak, all of whom (I believe) are engaged in research activities at Kodak, Ltd., Harrow, England. My first impulse upon receiving the reprint was to read it quickly and report it in this column. But in the very first sentence I found that its contents referred to progress in 1956, and so my enthusiasm to be newsy waned a bit.

However, as I read the review it became evident that a report in 1956 could hardly find its way in the literature until well into 1957. Also, many of the items discussed by the authors were indeed foreign to me, in spite of the fact that I receive about 100 journals each month and make some attempt to keep abreast of recent work in the science and applications of photography.

Therefore, I reversed myself and began to underline certain sections and statements for discussion, purely on the arbitrary assumption that if a fair part of the material were new to me, it would be new to my readers.

But despite good intentions, I soon found myself in a dilemma. Re-reading each underlined item invariably led to the question, "Are industrial photographers interested in *this?*", followed by my mental reply, "If they are not, they should be!"

Egghead Minority

I have always had a high respect for serious photographers, many of whom are concentrated in the industrial photographic areas. It has been my feeling that they have an intellectual intent which is seldom recognized and rarely satisfied. Yet, I have been told over and over again by editors of photographic magazines that working photographers are interested only in step-by-step procedures (so to speak) on how to accomplish a particular end-result. I can't quite swallow this, even though I know that in terms of the "greatest number" their opinion probably is more correct than mine. Therefore, I shall take refuge from the likely criticisms against this particular column by stating that it was written *especially* for the assumed minority of eggheads in the field of industrial photography.

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important single event of 1956 in all aspects of photographic science to be the Cologne International Conference, held in September, 1956. At the time their review was written they could only make statements such as, "The transactions of this conference, when published, will constitute a thorough review of the present state of photographic science." In the interim, however, the transactions have appeared under the title "Wissenschaftliche Photographie" and the volume is available from Verlag Dr. Othmar Helwich, Darmstadt und Wien. (It is convenient for Americans to purchase such foreign works through Dekker en Nordemann, N. V., O. Z. Voorburgwal 243, Amsterdam-C, Holland since payment can be made by check to their account with the National City Bank of New York, 250 Fifth Ave., New York 1, N. Y.)

In absence of these published transactions the authors reported on other research findings presented in various scientific periodicals. I shall draw freely from their review, but will frequently make additional comments and will do a considerable amount of paraphrasing.

More Restrictive

Photographic sensitivity is considered by working photographers to be synonmous with "film speed." In a sense this characterization of sensitivity is correct, but the photographic scientist tends to be more restrictive. He regards the individual silver halide crystals of an emulsion as his latent image unit, rather than the totality of emulsion crystals as the criterion for discussing latent image formation.

In this sense, the change in an emulsion crystal on exposure necessary to make it developable (reducible to silver in a developer) is thought to be a two-stage phenomenon, resulting in the formation of a speck of silver only a few atoms in size, usually on the surface of the crystal. However, this silver speck can be created just below the surface boundaries of the crystal, or well within its depths. The speck is far too small to be observed by the known methods of optical or electron magnification. Thus, it has been studied by various indirect means, particularly with respect to its position on or within the silver halide grain. Pre-bleach solutions for silver and special surface or internal latent image developers have been used primarily for such studies. Naturally, a more direct method of observation has been sought.

Nail, Moser and Urbach disclosed a novel system by which latent image growth can be directly recorded. (J. O. S. A., Vol. 46, p. 218, 1956). They took advantage of the well-known fact that silver metal is a potent absorber of the longer wavelengths of red light. Their procedure was particularly use-

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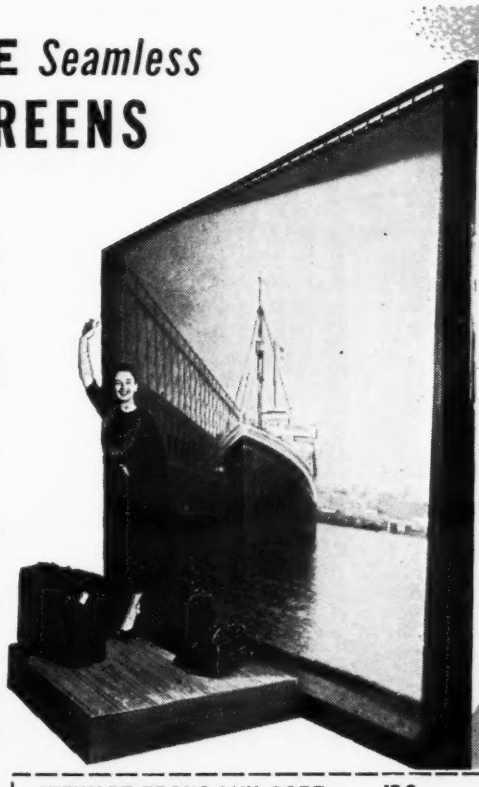

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AS OTHERS SEE IT

continued from page 59

ful in studying photographic emulsions of low sensitivity. (Later studies reported by Moser and Urbach in *Physical Review*, Vol. 103, p. 1519, indicate that spectral absorption data for silver halides in the visible region may lead to precise calculation of the absolute minimum amount of light energy, i.e., least quanta necessary to make an emulsion grain developable.)

Now what do such studies and findings mean even to the serious students of applied photography? As such I fear they mean very little. On the other hand, when certain anomalies of photographic emulsions are brought into the picture, how can they be sensibly explained without such knowledge being assumed.

Maximum Sensitivity

Practice shows that emulsions generally used exhibit a maximum sensitivity when the illumination conditions are such that an exposure *time* of about 0.01 second is required. Why should this be so? And why are there exceptions even to this generality? That we are dealing in rather small variations in cause and effect relationships must be admitted. Is there any mystery, then, about the variable results that arise when conditions are altered, even through the absolute *products* of the practical exposure variables remain constant? There should be no mystery or doubts about the fact that such anomalies are inherent in the silver halide photographic system, especially when the experimental facts about the light-responsive characteristics of silver halide crystals—meager as they are—are understood.

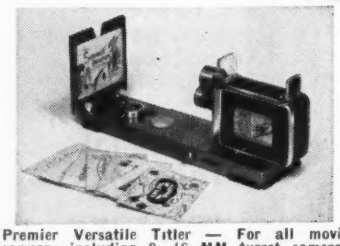
Let me emphasize the need for understanding the peculiar response characteristics of photographic emulsions by quoting, in part, a few brief statements made in the aforementioned review:

". . . light exposures are not additive. An emulsion can be hypersensitized by a small, short-time pre-exposure or the latent image can be intensified by a weak, long-time post-exposure. . . . Generally the sensitivity increase is less the higher the inherent sensitivity of the material and the longer the duration of development."

Now you can call such statements anything you care to if you want to take pride in being ignorant of the photographic process. You can say they are "theoretical," "impractical," "confusing," "highbrow," etc. But the so-called eggheads in industrial photography will make the necessary adjustments so that these statements become a common part of their thinking apparatus, always realizing the possibility that film manufacturers can change their pattern of thought by diminishing the "inherent" to near zero. □

Articles on topics ranging from aerial to x-ray photography are listed in the new 1957 INDUSTRIAL PHOTOGRAPHY Index. A limited number of indexes from previous years is also available. Requests for all copies should be made on company stationery.

Premier Products Better Products



Premier Versatile Titler — For all movie cameras including 8, 16 MM turret cameras with varied focal lenses. Lens holder, auxiliary lens, title cards, mounting equipment. Complete, $6.95 list.

Premier Minit-minder — Timer for Polaroid land cameras with alarm bell. Attaches to camera. Chrome finish, quality built. $4.50 list.

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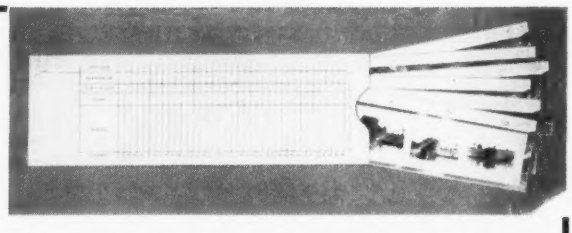
. . . for more details circle 570, page 73

NEGA-TUBES for FILM STRIPS

make filing and finding easy . . . keep negs flat



Made in all popular sizes, Nega-Tubes contain transparent acetate sleeves to protect strip negatives . . . permit enlarging of negs without extracting from sleeves. Nega-Tubes are made of heavy, thumb-cut manila stock printed for complete data record of exposure. Each Nega-Tube contains transparent acetate sleeves or glassine envelopes to hold a complete roll of film, in strips. Sleeves are also thumb-cut and feature a plain white edge for notations in pencil or pen.

No. 35-A Nega-Tube (shown) contains 6 acetate sleeves for strips of 6 exposures of 35 mm film. Only $27.00 per hundred. No. 35-G Nega-Tube, with 6 glassine envelopes only $12.00 per hundred. No. 350-A-00 Chest with 300 No. 35-A Nega-Tubes @ $89.45: No. 350-G-00 Chest with 300 No. 35-G Nega-Tubes @ $44.45.

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. . . for more details circle 566, page 73

NEW EQUIPMENT

continued from page 57

plied in either a Praktina bayonet mount or a screw-in mount for the Prakticas. Weight is 10 ounces, overall length, 5⅜". The angle of view is 11.4° and the focusing range from 8 feet to infinity. Apertures range from *f*/5.5 to *f*/22. Mount is pre-set. List price, $82.95.

Retouch Table 151

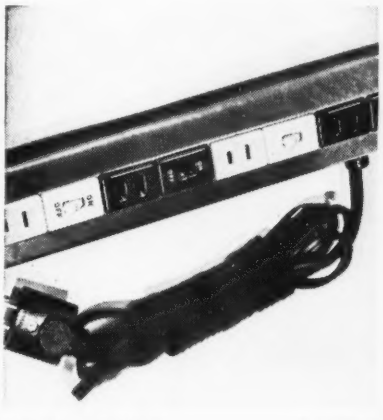
The new Micro-Perfect Artists' Retouch Table, manufactured by *Bar-Plate Manufacturing Co.*, is entirely of 16 gauge cold rolled steel. Available in 20 x 24, 26 x 30 and 30 x 40 standard sizes. Other sizes on special order. It comes with double strength opal glass and ¼" clear plate glass top, 3-way fluorescent light setup, four adjustable straight edges, an adjustable bridge, large storage cabinet and paper rest. Working surface is adjustable.

Power Transistor Flash 152

The Mecablitz 100 electronic flash unit being distributed by *Burleigh Brooks* uses a power transistor in the power generator eliminating the need for vibrators. Basically the new design circuit provides 500V-AC, with a recycling time of 10 seconds. Slim and weighing only four pounds the Model 100 uses six ordinary "D" cells and costs $49.50.

Selector Switch 153

CBC Electronics Co., Inc. has announced a four-outlet selector switch, complete with heater cord and fused plug, to provide a control center for four different pieces of equipment. Each pair of switches is in contrasting colors for quick identification. It is rated at 15 amps., 115 volts. □



Selector Switch See 153

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New Orleans, La.	L. L. Ridgway Company
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SNIP!

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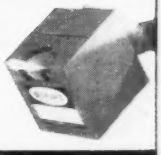

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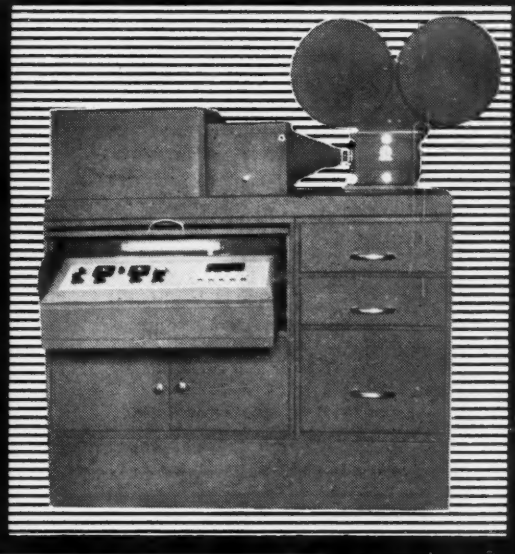

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. . . for more details circle 587, page 73

Beattie

ELECTRIC CAMERAS

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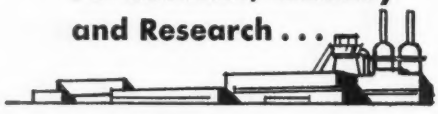

Beattie VARITRON Electric Camera—Model E.

These modern, rugged cameras are designed for remote control operation, and automatically record any object or event on film . . . at fixed time intervals . . . or at random intervals, if desired. Known as demand-rate or pulse-type, they do not require an operator—an electrical pulse or signal causes the camera to take one or more pictures automatically without attention.

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ACKNOWLEDGED LEADERS IN THE MANUFACTURE OF ELECTRIC CAMERAS

. . . for more details circle 513, page 73

PHOTOGRAPHIC Science & Instrumentation

HIGH SPEED CAMERA PICKS COMPUTER BRAIN

by HELEN WATERMAN

Newest, and ultimately perhaps the most important, function allotted to photography is a mind-reading act. The minds, giant electronic "brains" too quick-thinking for mechanical recording devices to keep up with, are the digital computers now being used by defense planners, aircraft designers, and scientists engaged in basic research.

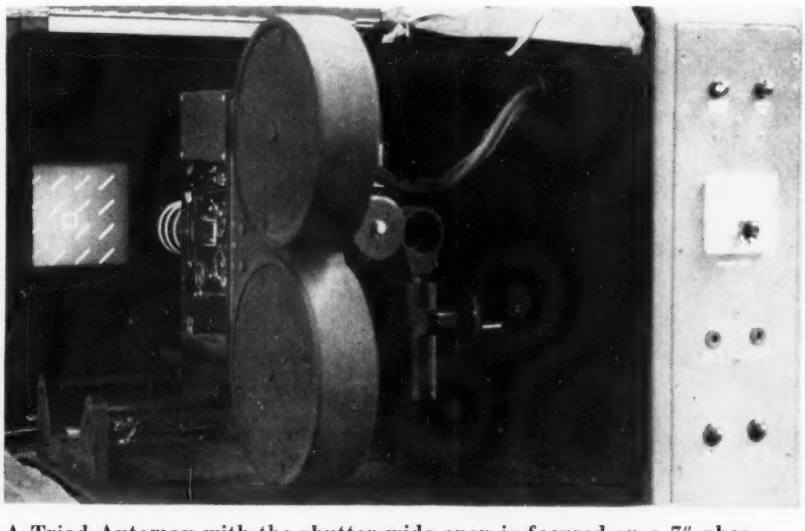
One computer, recently, was fed a problem by means of punched cards. It took five hours just to state the problem to the machine, but the answer was worked out and photographically recorded five minutes later!

Even more important, though, is the part the camera can play in letting human experts stop the brain in mid-problem, to intervene, if need be, with supplementary data or revised instructions. Without some means of interpolation, the computer would continue inexorably to a solution on the basis of the original directions, like the water-carrying brooms of Walt Disney's "Sorcerer's Apprentice," no matter how useless further calculations might have become.

The key is a computer-readout utilizing the CHARACTRON shaped beam tube, manufactured by Stromberg-Carlson —San Diego, a division of General Dynamics, that acts as an electronic stenographer. Looking somewhat like an elongated television tube, it records split-second "dictation" at the rate of 15,000 characters (words, numerals, or symbols) per second. This is equivalent to 9000 human stenographers working in three eight hour shifts and typing steadily at the rate of 60 words per minute, to total 10,800,000 words per hour.

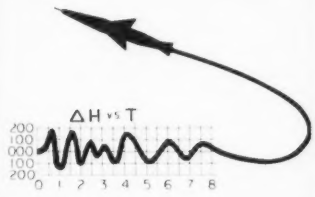
Permanently on Film

All those computer "thoughts" — words, statistics, or even relationships recorded as graphs and curves, saving immeasurable time in plotting —are permanently captured on film. Either automatically developed in the camera for immediate viewing, or in the lab, selected shots may be printed up for inclusion in engineering reports or as work-sheets to be pondered and scribbled over. Every step in each problem is easily filed for reference, a safeguard that under the adding - machine - and - typed - re -



A Triad Automax with the shutter wide open is focused on a 7″ phosphor-coated screen. Electronic impulses govern film advance.

RESEARCH PHOTOGRAPHY *must provide* RESEARCH DATA



• Quantitative data relative to velocity, displacement, direction, acceleration, etc., may be accurately and quickly read from film by Vanguard Motion Analyzers.

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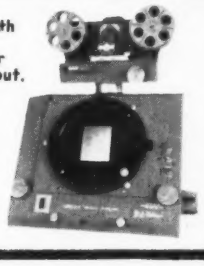
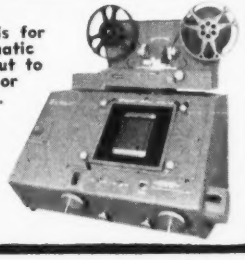
Models with crosshair micrometer dial readout.



• Vanguard Motion Analyzers are available in a variety of standard models for 8, 16, 35 and 70 mm film sizes and magnification. Coordinate position readout is from movable crosshairs superimposed on the magnified rear projected image and readout is to .001 inch at the image. Frame Count, precise registration, and other features are built in.

Models for automatic readout to tape or cards.



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INSTRUMENT
CORPORATION
184 Casper St., Valley Stream, N. Y.
California Rep.—TRIAD CORP.
17136 Ventura Blvd., Encino, Calif.

. . . for more details circle 596, page 73

port system would need literally thousands of times as much storage space.

Various cameras have been used with CHARACTON computer-readouts. At Elgin Air Force Base, Florida, the readout system designed for use with a Remington Rand Univac employs a Traid Automax camera, which sits with wide-open shutter in a light-tight box, facing a 7" phosphor-coated screen. Nothing moves outside the camera, but electronic impulses "take" information from the Univac and "type" it across the screen. In the split second when each message is completed, the camera shutter is actuated and the computer flashes an order to advance the film.

Extreme Speed

Speed far faster than any teletype or automatic typewriter so far is needed only with electronic computers, but since their time costs hundreds of dollars per hour, the results must be recorded equally rapidly or their extreme speed has no value.

The Naval Proving Ground at Dahlgren, Virginia, has ordered a high speed printer for use with its NORC, probably the fastest computer in existence today. Used mainly in "debugging" basic engineering programs, ballistic tables, etc., their NORC will operate a British made 35mm camera, the Kelvin - Hughes rapid - processing photographic projector, that passes chemicals over the film immediately after exposure and almost at once flashes an enlargement upon a screen. This makes problem-revisions practical . . . at any point.

Convair has had best results with a Traid Automax, although that film must be developed in the company's photo lab. Another installation, which will use both a Traid Automax and a Polaroid Land Camera, is being designed for use specifically with Remington-Rand's LARC at the Livermore Atomic Energy Laboratory.

Another specialized version is the INDICODER binary decoding tube. "Binary code" is

continued on page 75

new name for an old friend

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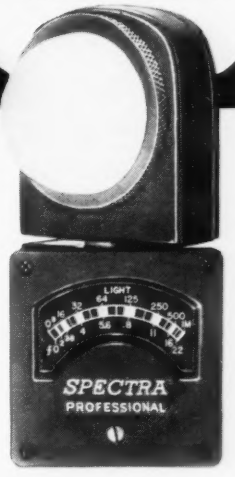
PROFESSIONAL
EXPOSURE METER



hand calibrated for precise accuracy

Popular for over a decade, the original model A has been greatly improved and is now available under the trade name "Spectra Professional".
It is especially designed for use in the motion picture, TV and professional photography where instant direct reading and great accuracy is a prime requirement. The ultra sensitive SPECTRA professional exposure meter comes complete with disk, grid, 12 film-speed slides and carrying case $97.50

Write for descriptive literature and complete specifications

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HOLLYWOOD 38,
CALIFORNIA

. . . for more details circle 571, page 73

A directory of ultra-long lenses for missile or sputnik tracking

Below is a practical reference list of the long lenses available for ultra long-distance photography in fields such as missile tracking, astronomical photography and allied areas. These lenses are broken down into four categories: lenses for 16mm and 35mm motion picture cameras, lenses for 35mm still cameras and lenses for large still cameras. Lenses are listed alphabetically within these categories by manufacturer or distributor. For more information on long lenses see David Eisendrath's column, "Industrial Workshop," page 38.

For 16mm Movie

Alfa American Corp.
303 West 42nd Street
New York 36, N. Y.
- 200mm f/3.5 Tele Saphir
- 260mm f/3.5 Tele Saphir
- 210mm f/4.5 Saphir
- 300mm f/4.5 Saphir
- 260mm f/4.5 Saphir
- 360mm f/4.5 Saphir
- 450mm f/4.5 Saphir
- 500mm f/5.6 Saphir
- 500mm f/6.3 Saphir
- 700mm f/6.3 Saphir
- 670mm f/20.0 Astro-Saphir
- 1000mm f/20.0 Astro-Saphir
- 2000mm f/20.0 Astro-Saphir
- 3000mm f/20.0 Astro-Saphir
- 5000mm f/20.0 Astro-Saphir

Bell & Howell
7100 McCormick Rd.
Chicago 45, Illinois
- 6" f/4.5 Bell & Howell-TTH

Burke & James, Inc.
321 S. Wabash Ave.
Chicago 4, Ill.
See General Distributors on page 80

Century Photographic Equipment
10659 Burbank Blvd.
North Hollywood, Calif.
- 230mm f/3.8 Century Tele-Athenar
- 300mm f/4.5 Century Tele-Athenar

Ercona Corporation
551 Fifth Avenue
New York 17, N. Y.
- 200mm f/5.0 Astro Fern
- 300mm f/5.0 Fernbild
- 300mm f/3.5 Telastan
- 400mm f/5.0 Fernbild
- 500mm f/5.0 Fernbild
- 640mm f/5.0 Fernbild
- 800mm f/5.0 Fernbild
- 1000mm f/6.3 Fernbild

Gordon Enterprises
5362 Cahuenga Blvd.
Hollywood, Calif.
See General Distributors on page 80

Karl Heitz, Inc.
480 Lexington Avenue
New York 17, N. Y.
- 210mm f/2.8 Kinoptik Apochromatic Telephoto
- 300mm f/3.5 Kinoptik Apochromatic Telephoto
- 500mm f/5.6 Kinoptik Apochromatic Telephoto

Kling Photo Corp.
257 Fourth Avenue
New York, N. Y.
- 300mm f/5.6 Kilfitt Tele-Kilar
- 400mm f/5.6 Kilfitt Fern-Kilar
- 600mm f/5.6 Kilfitt Fern-Kilar

Sterling-Howard Corp.
561 East Tremont Avenue
New York 57, N. Y.
- 400mm f/5.5 Tele-Astra

Voss Photo Corporation
601 West 156th Street
New York, N. Y.
- 300mm f/3.5 Tewe
- 400mm f/5.0 Tewe
- 500mm f/5.0 Tewe
- 600mm f/5.0 Tewe
- 800mm f/5.0 Tewe
- 1000mm f/6.3 Tewe
- 2000mm f/10.0 Tewe
- 250mm f/5.5 Piesker
- 400mm f/5.5 Piesker
- 400mm f/4.5 Piesker

Wollensak Optical Company
850 Hudson Avenue
Rochester 21, N. Y.
- 254mm f/4.5 Cine Raptar
- 306mm f/4.5 Cine Raptar
- 358mm f/4.5 Cine Raptar
- 380mm f/4.5 Cine Raptar
- 406mm f/5.6 Cine Raptar
- 432mm f/5.6 Cine Raptar
- 458mm f/5.6 Cine Raptar
- 508mm f/5.6 Cine Raptar
- 610mm f/5.6 Cine Raptar
- 688mm f/5.6 Cine Raptar

Zoomar, Inc.
55 Sea Cliff Avenue
Glen Cove, New York
- 40" f/8.0 Zoomar Reflectar
- 80" f/15.0 Zoomar Reflectar
- 100" f/20.0 Zoomar Reflectar
- 150" f/25.0 Zoomar Reflectar

For 35mm Movie

Alfa American Corp.
303 West 42nd Street
New York 36, N. Y.
- 670mm f/20.0 Astro-Saphir
- 1000mm f/20.10 Astro-Saphir
- 2000mm f/20.0 Astro-Saphir
- 3000mm f/20.0 Astro-Saphir
- 5000mm f/20.0 Astro-Saphir
- 210mm f/4.5 Saphir
- 260mm f/4.5 Saphir
- 300mm f/4.5 Saphir
- 360mm f/4.5 Saphir
- 450mm f/4.5 Saphir
- 500mm f/5.6 Saphir
- 500mm f/6.3 Saphir
- 700mm f/6.3 Saphir
- 200mm f/3.5 Tele Saphir
- 260mm f/3.5 Tele Saphir

Burke & James, Inc.
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Chicago 4, Ill.
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Century Photographic Equipment
10659 Burbank Blvd.
North Hollywood, Calif.
- 300mm f/4.5 Century Tele-Athenar
- 385mm f/4.5 Century Tele-Athenar

Ercona Corporation
551 Fifth Avenue
New York 17, N. Y.
- 300mm f/5.0 Fernbild
- 400mm f/5.0 Fernbild
- 500mm f/5.0 Fernbild
- 640mm f/5.0 Fernbild
- 800mm f/5.0 Fernbild
- 1000mm f/6.3 Fernbild
- 300mm f/3.5 Telastan

Gordon Enterprises
5362 Cahuenga Blvd.
Hollywood, Calif.
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Kling Photo Corp.
257 Fourth Avenue
New York, N. Y.
- 400mm f/5.6 Kilfitt Fern-Kilar
- 600mm f/5.6 Kilfitt Fern-Kilar
- 300mm f/5.6 Kilfitt Tele-Kilar

Sterling Howard Corp.
561 East Tremont Ave.
New York 57, N. Y.
- 400mm f/5.5 Tele-Astra

Voss Photo Corporation
601 West 156th Street
New York, N. Y.
- 400mm f/5.0 Tewe
- 500mm f/5.0 Tewe
- 600mm f/5.0 Tewe
- 800mm f/5.0 Tewe
- 1000mm f/6.3 Tewe
- 2000mm f/10.0 Tewe

Wollensak Optical Company
850 Hudson Avenue
Rochester 21, N. Y.
- 254mm f/4.5 Cine Raptar
- 306mm f/4.5 Cine Raptar
- 358mm f/4.5 Cine Raptar
- 380mm f/4.5 Cine Raptar
- 406mm f/5.6 Cine Raptar
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- 458mm f/5.6 Cine Raptar
- 508mm f/5.6 Cine Raptar
- 610mm f/5.6 Cine Raptar
- 688mm f/5.6 Cine Raptar

Zoomar, Inc.
55 Sea Cliff Avenue
Glen Cove, N. Y.
- 40" f/8.0 Zoomar Reflectar
- 80" f/15.0 Zoomar Reflectar
- 100" f/20.0 Zoomar Reflectar
- 150" f/25.0 Zoomar Reflectar

For 35mm Still

Alfa American Corp.
303 West 42nd Street
New York 36, N. Y.
- 500mm f/2.8 Saphir
- 500mm f/3.5 Saphir
- 500mm f/4.5 Saphir
- 500mm f/5.6 Saphir
- 500mm f/6.3 Saphir
- 700mm f/6.3 Saphir
- 400mm f/3.5 Tele-Saphir
- 500mm f/3.5 Tele-Saphir

Asahi Optical Co., Inc.
521 Fifth Avenue
New York, N. Y.
- 500mm f/5.0 Asahi Takumar

Bausch & Lomb Optical Company
635 St. Paul Street
Rochester 2, N. Y.
- 1000mm f/16.7 BALscope Sr.

Burke & James, Inc.
321 S. Wabash Ave.
Chicago 4, Ill.
See General Distributors on page 80

Canon Camera Co., Inc.
550 Fifth Avenue
New York 36, N. Y.
- 400mm f/4.5 Canon

Century Photographic Equipment
10659 Burbank Blvd.
North Hollywood, California
- 500mm f/5.6 Century Tele-Athenar
- 600mm f/6.3 Century Tele-Athenar

Ercona Corporation
551 Fifth Avenue
New York 17, N. Y.
- 300mm f/5.0 Fernbild

400mm f/5.0 Fernbild
500mm f/5.0 Fernbild
640mm f/5.0 Fernbild
800mm f/5.0 Fernbild
1000mm f/6.3 Fernbild
300mm f/3.5 Telastan

Gordon Enterprises
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Hollywood, Calif.
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Exacta Camera Company
705 Bronx River Road
Bronxville, N. Y.
400mm f/5.5 Hugo Meyer Goerlitz Tewe-Megor
400mm f/4.5 Tewe Fernlinse Telagon
500mm f/5.0 Tewe Fernlinse Telagon
800mm f/6.3 Tewe Fernlinse Telon

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for more information see "Industrial Workshop"

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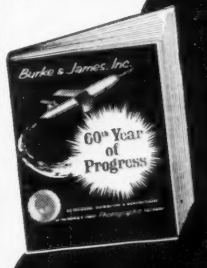

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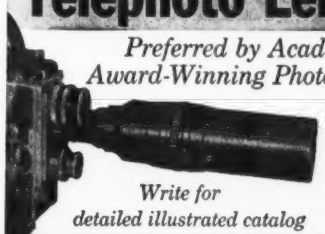

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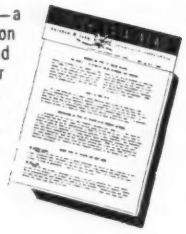

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MOVIE CLINIC

continued from page 53

How many facts about its greater economy and greater capability can you absorb? Sooner or later you'll find yourself watching the driver, or wondering what part of the country boasts such nice looking farm land.

Animation, however, showing a tractor as a symbol, placed where you want it without extraneous material, or with such material properly subdued, might very well give you a more effective, more memorable selling job.

Or suppose you've got a home appliance to demonstrate. An attractive woman showing your appliance in use is the usual thing, and is to be encouraged by everyone who likes to watch attractive women. But doesn't her very attractiveness distract the audience from the machine? Mightn't it be better selling to perhaps break the appliance down, put it together again, and show it in use in an amusing, interesting - captivating way?

Reusable Symbols

A further advantage of animation is that it is timeless. Your company's tractor will change in appearance as new and improved models are brought out. Your attractive girl will be wearing a different hair-do and a different kind of dress next year. But symbols of what you are selling will always be usable again.

Because animation is quicker in putting ideas across, an animated film can be much shorter. If you have a story that needs twenty minutes to tell in live photography, you probably will be able to tell it in ten by the use of animated symbolism. So the higher cost of using full animation may be offset by telling your story more concisely in a shorter film—a shorter film that will have a more memorable effect on your audiences.

There are times, of course, when the use of animation can be wrong. A tractor doing a particular job such as pulling stumps can show what it can do most believably in live action photography. When you must show people, or machines, or anything in a specified kind of locality doing a certain thing, then forget animation.

But to show behavior patterns, by all means consider the use of symbols for them as expressed in animation, because it is as symbols these patterns will best be understood.

To sum up: animation can make abstract ideas clear. It can make the most complicated product or the most intricate process of manufacture appear simple and easy to understand. Animation can go straight to the point, by-passing extraneous detail. Animation can often do a better job of instructing, persuading, explaining. And because animation devices are symbols for behavior patterns, animation can *sell* your company, or your product, or your service in a uniquely effective way.

The second part of this article will outline various animation techniques available for use in industrial films. Many of them can cost less than live photography.

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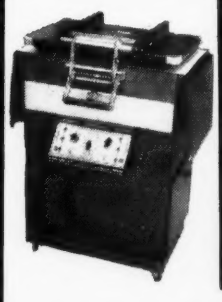

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"EXPORTING"

continued from page 42

it on a continuously moving roll of Autopositive paper 36" or 42" wide and 300 or 600 feet long.

As it threaded through the machine the paper was automatically exposed, developed, fixed, washed, dried and deposited on a cutting table. The finished prints were turned out at a rate of four to five and a half feet per minute.

As a result of initial experiments, Willys now uses two different Autopositive materials in supplying intermediates to its overseas operations. For Argentina, where the engineering staff is authorized to modify designs as market conditions dictate, the drawings have been put on Autopositive Translucent stock. With this material, the prints actually become engineering masters. The detail can be erased and redrawn when changes are necessary.

For plants in England, India and Japan, Autopositive Extra Thin stock is used. The prints are satisfactory for blueprints but less suitable for changes, since lines can be eradicated but not erased.

Once the adapted blueprint machine was set up and working, it was used in engineering reproduction at the Toledo plant. The entire file of tracings has been reproduced on Autopositive Translucent material. It is maintained in the Engineering Reproduction department and kept up to date with all changes, amendments or corrections.

All requests for blueprints are filled from it instead of the file of original engineering tracings, as had been the practice formerly. This saves wear on the drawings and allows them to be kept in the engineering department for reference by authorized engineers and draftsmen.

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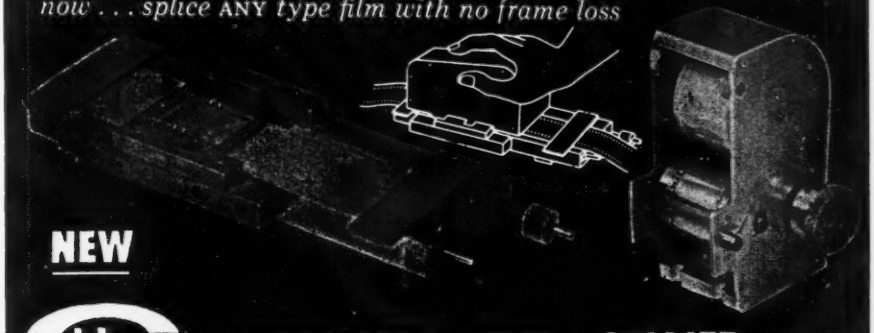

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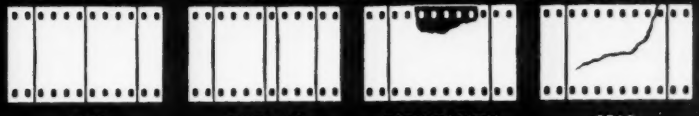

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FUR (Failure, Unsatisfactory or Removal Report) and AMPFUR (Amplified FUR) are combined IBM punch-card and microfilm insert systems through which the Navy quickly and completely gathers, records and routes information on defects in materials and equipment. Speedy processing of reported defects allows the Navy to instantly warn flying squadrons of potential accident causes. It also enables manufacturers to quickly halt costly production and take corrective action.

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Formerly, material-assessed causes of accidents were reported on lengthy forms which took extensive time to fill out. On receipt, copies of the report were scattered all over the bureau. In addition to the storage problems and delays in transmission caused by bulky reports, they could not be easily consolidated for overall appraisal. As a result, trends in accident causes and trouble areas were not detected soon enough to prevent unnecessary losses.

Today, all of these drawbacks have been eliminated. When any item on a plane (except expendable ones like nuts and bolts) has to be replaced, a service man enters the facts about it on a standard FUR or AMPFUR form, attaching sketches of photos if available. The form is then forwarded from naval air station or carrier or other base of operations to the central Navy Processing Center at Quonset Point, Rhode Island.

First the reports are checked for proper codes and station identifications. Next they are photographed on 16mm microfilm. Then the data from the FUR or AMPFUR form is punched into an IBM card. Last, strips of microfilm about 1¾ inches long, containing the fronts and backs of the reports and any pictures or sketches, are inserted into notched windows in the card.

Five duplicates are made of each card with positive film prints inserted in the windows. One goes to the Bureau of Aeronautics in Washington, one to the plane manufacturer, one to the contractor making the defective parts, one to the Naval Aviation Safety Center in Norfolk, Virginia, and one is retained in a permanent file.

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Monthly summaries are also produced. These go to over 125 field inspection offices and technical sections of military staffs. In the tabulation, reports of identical failures appear in groups with rate trends during each of the last four months. Unusual trouble areas are readily spotted.

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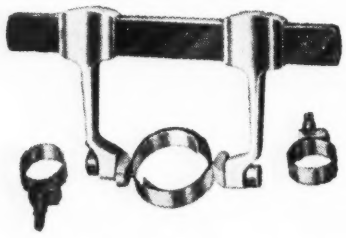

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J. G. Saltzman, Inc. Complete details on enlargers, camera stands, lighting units and sinks.

Bulletin No. 4 **212**
Plymouth Products Company, Inc. Data sheet on Ethol UFG Developer and Replenisher for all sizes and types of film.

Automatic Daylight Processing **213**
Micro Record Corp. Developing tank for up to 200′ of 8mm, 16mm,

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or 35mm film complemented by motor driven drier.

Hi-Speed Rotary Washers 214
Lenz Washer Co. Data on equipment to cut washing time and costs 50 per cent.

Automatic Tri-Film Processor 215
Canadian Applied Research Ltd. Literature on a film processor capable of handling 16, 35 or 70mm film.

Photo Equipment Price List 216
Columbian Enameling & Stamping Co. Specifications, prices and data on porcelain enameled steel and stainless steel photo trays.

Processing Chemicals 217
Brown-Forman Industries, 10 pp. Improved printing and developing through use of BFI spot test kit, print flattening solution, and hypo neutralizers.

Flash-o-graph Fixer 218
Philip A. Hunt Co. Processing data on fixer which rapidly clears photo-mechanical, commercial pan film, and photo papers.

Eliminate Retouching 219
Thoro Products Co. Data on Pictrol, an enlarger attachment, that converts any lens into a variable soft focus lens.

Chill-Chaser Immersion 220
Still-Man Equipment Corp. Information on new immersion tank heaters of acid resisting stainless steel alloy.

Simplex Dryers 221
Simplex Specialty Co., Inc. Descriptive illustrated folders on complete line of print dryers.

Color Enlarging Meter 222
Lester C. Hehn. Photo-Design color enlarging meter to determine exposure for dye transfer enlargements.

Protect-o-Film 223
Harwald Co. A new film conditioner. Stops scratches, kills "greenness," cuts static, cleans and conditions.

AUDIO

FilMagic Pylon 225
Distributor's Group, Inc. Unit cleans and lubricates tapes and films while they play.

Reeves Equipment 226
Reeves Equipment Corp. 40 pp. Specifications on full line of motion picture cameras, sound recording and lighting equipment.

CINEMATOGRAPHY

Samenco Movie Control 227
Sample Engineering Co. How to make time-lapse movies with any spring-driven camera.

How to Use Your Cine-Voice 228
Berndt-Bach, Inc. 14 pp. Instruction booklet telling how to make 16mm sound movies.

Camera Rental List 229
Camera Equipment Co. 17 pp. List of cameras, lights and other equipment available for rent on daily or weekly basis.

16mm Production & Laboratory Services 230
The Calvin Company. 43 pp. Brochure containing educational information on all phases of 16mm film production and services.

continued on page 72

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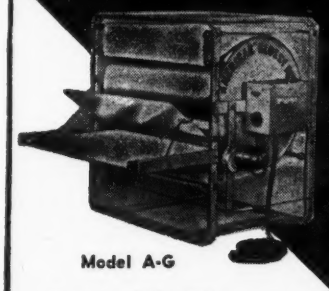

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W 32" D 32" H 28"
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Animation Units **231**
Animation Equipment Corp. 8 pp. Design features of integrated animation units and their uses. Reprinted from SMPTE Journal.

Mini-Rapid 16 **232**
Fairchild Camera and Instrument. Information on table-top automatic 16mm film processor. Enables viewing of 100′ rolls within twenty minutes of shooting.

Mitchell 16mm Professional **233**
Mitchell Camera Co. 20 pp. Brochure illustrating application of the 16mm camera in business and industry. Manual of operation for cameras and accessories.

Drive Bulletins **234**
Lafayette Instrument Co. Synchronous Motor Drives for Bell & Howell, Bolex H-16, Kodak Cine Special.

Precision Editing Equipment **235**
Hollywood Film Company. 64 pp. Comprehensive data, illustrations, specifications on precision film editing equipment. Price list.

Film Editing Equipment **236**
Moviola Manufacturing Co. Editing machines for 16 or 35mm films, with searching head for magnetic film, synchronizers, rewinders.

Catalog **237**
Television Equipment Co. Catalog of motion-picture equipment—lights, splicing tape, cue markers, cameras, etc.

Low-Cost Business Films **238**
Telefilm Inc. Booklet on do-it-yourself production plan that lowers cost of business films.

INSTRUMENTATION

K-5 Oscillotron **240**
Beattie-Coleman, Inc. Technical information on camera recording system. Specifications and prices.

M-16C Motion Analyzer **241**
Vanguard Instrument Corp. Description of camera with provision for mounting automatic data readout to X, Y and frame count outputs.

CAMERAS, LENSES, ACCESSORIES

Catalog **242**
Burke and James Inc. Data on more than 2000 photographic tools, including lenses from ¼″ to 72″.

Kilfitt Lens Catalog **243**
Kling Photo Corp. 12 pp. Listing and description of Kilar lenses, reflex housings, extension attachments and accessories.

Long Lenses **244**
Gordon Enterprises. Information on a wide variety of lenses for use in missile or astronomical work.

New Cut Film Holders **245**
Fidelity Mfg. Co. 8pp. Describes new Fidelity Custom 4x5 and 5x7 cut film holders. Section on how to number film.

Rent-a-Long **246**
Long Equipment, Inc. Descriptive information on renting services for any type of photographic equipment.

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. . . for more details circle 541, page 73

INSTRUMENTATION

continued from page 63

what scientists call computer-language. This tube converts not only into readable words or numbers, but also into symbols whose movement across a screen can interpret moving forces.

For example, "everybody," according to Harold P. Field, Stromberg-Carlson's San Diego manager, is trying to work out an air traffic control simulator. "The big problem," he says, "is data analysis—recreating various situations so responsible officials can hold post mortems without depending on just memory and notes. Playing back a run requires extremely precise data recording and data reduction systems, to recreate the situation but with the added advantage of being able to stop time. It must show weather conditions, how busy people were at any given moment, what effect course changes would have made, etc., all synchronized with the controller's instructions on sound tape."

A set-up already in use for long range aircraft charting by the Air Force Continental Defense shows identifying symbols moving across an overlay map.

The 1957 Editorial Index for "Industrial Photography" is now ready for distribution. A few previous years' indexes are also available.

TIME-LAPSE

continued from page 27

Shortly after development work was completed on this unit, a second unit was constructed designed to permit exposure time intervals of 2, 4, 10, 20, 30 and 60 seconds. Since it was necessary to maintain artificial illumination continuously while making exposures in these short time intervals, no provision was made for automatic control of lighting equipment.

The timer mechanism in this unit consists of a motor making one revolution per minute. Mounted on the motor shaft is a spring contact that wipes across 30 individual contacts that are aligned on the inside of a 3½ inch diameter Bakelite tube. By means of a 6-gang, 6-position switch, any combination of contacts can be selected to give the desired time exposure interval.

Operational features vary from those of the initially designed unit in several ways. When a contact is made, a 6-volt AC relay is closed which discharges a condenser through a 5000 ohm relay. This relay then closes momentarily, activates the camera motor so that the cam releases the microswitch, thus permitting one exposure to be made. Also, a switch is mounted on the first unit which shorts out the microswitch so that the camera may be run continuously, allowing one exposure per second.

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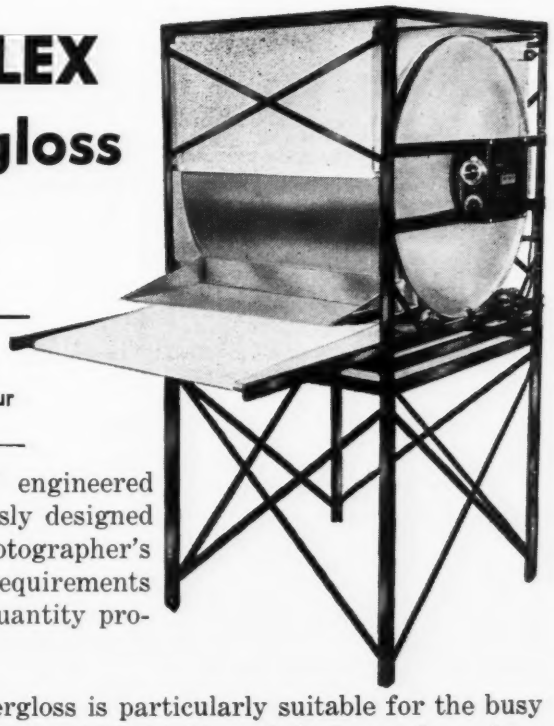

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Print Sizes	All sizes up to 26" wide
Drum Speed	4 to 10 minutes per revolution

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. . . for more details circle 579, page 73

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with the features you asked for

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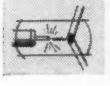

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IP

ARTICLE
NEWS
SPEECH
PHOTO

} Briefs

SIX-CAMERA PHOTO-RECON POD FOR RB-58 HUSTLER

The Convair RB-58 Hustler, world's first supersonic bomber, is equipped with more photo equipment than the average studio.

For example, in the nose of a photo-recon pod, which fits on the ship's underbelly, is a closed-circuit TV system (with wide and narrow fields), behind which are located six aerial cameras of different angles, viewing fields and film sizes.

A quick change system is also provided for the new device, allowing the equipment to be modified for use on either high- or low-altitude photo missions.

Three variations of existing aerial cameras are used in the photo plane, said to be capable of traveling at over 1130 mph.

Most of the equipment also features automatic image motion compensation and printed data on the photos.

Weston Dies

Edward Weston, 71, often classed as the world's foremost photographer, died last month at his California home. First person ever to receive the Guggenheim fellowship for photography, he used little equipment, seldom cropped or retouched and did not get around to trying color materials until 1947—when he produced some of his most outstanding pictures.

Two For One

U. S. Army Signal Corps photo technicians have modified a Polaroid I.D. camera's optical system so that two photos of new inductees can be made on the same print—thereby doubling the output of the Identification Section at Ft. Dix, N. J.

One stereotach prism in the optical system of the identification camera which originally made two photos was removed and the distance between subject and lens was lengthened. In this fashion two different photos were made simultaneously, increasing to 1000 the possible number of trainees who could be photographed daily.

Photocopy Profits

The City of Chicopee, Mass., has reported a $4196 return on its $400 investment in a photocopy machine in the Traffic Bureau.

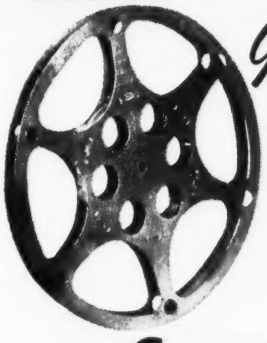
The machine was installed in October, 1955, since which time a fee of $3 per copy for each city accident report has been charged to insurance agents, attorneys and others requiring copies.

Success of the department's investment has stimulated the use of photocopiers in other area municipal departments.

Price Reductions

Carl Zeiss, Inc. has announced price reductions on three of its products. The Zeiss Ikon Ikophot Rapid exposure meter has been lowered in price to $19.95 from $25; the Zeiss Ikon Nettar IIB camera from $33 to $29 and the Zeiss Ikon Nettax from $58 to $52.

Extra Quality



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. . . for more details circle 563, page 73

12 Annual Show

The 12th Annual National Photographic Show is being held Feb. 17-23 in New York City's Coliseum this year.

Atomic Data Preserved

More than 9000 pages of historical data describing the development of the atomic energy era have been microfilmed and sealed in a cornerstone of the new Atomic Energy Commission's Germantown, Md., headquarters.

President Dwight D. Eisenhower assisted in sealing the microfilm into the building during inaugural ceremonies recently.

Including a copy of a letter from Dr. Albert Einstein to the late Pres. Franklin D. Roosevelt which suggested the use of uranium as a new source of energy, the films also contain a report of the first initiated and controlled nuclear chain reaction, excerpts of the development of the first atom bomb, proceedings of the 1955 International Conference on the Peaceful Uses of the Atom and a summary of medical use of atomic energy.

Name Change

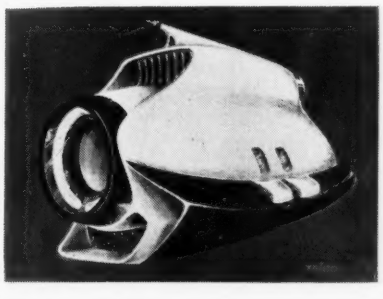
The Hoffman Professional Camera Repair Service has announced a name change to The Hoffman Professional Camera Co., specializing in the manufacture of film holders and special camera equipment.

Futuristic Camera

Industrial Designer Fritz Costabel has dreamed up a gadget-laden camera of tomorrow which features all push button operation, automatic radar focusing and a flash tube wrapped around the lens.

Looking somewhat like a Buck Rogers space ship in miniature, the model 35mm camera will have a very large aperture, a self-contained electronic flash system and just one variable focal length lens —with wide angle (180° coverage) to telephoto and triple helical focusing mounts for extreme close-ups. And he says it might even be entirely electronic.

PS: Don't try to place an order . . . it's only a dream!



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DOCUMENTARY

continued from page 23

picture sequence ran smoothly on the screen, Downie, whose background includes fifteen years of newspaper writing and photography, rewrote the rough script to fit the footage.

Before final edit, or if possible, before starting the film, the producer should outline the basic scope of the film and audience potential. A film slanted toward engineer recruitment, for example, would differ greatly in treatment from the same film pointed toward the financial community. Should the subject be of sufficiently broad interest, a middle - of - the - road treatment may make it acceptable to many groups, including television use and school visual education. "The Other Side of the Mountain"—eventual title of the film—was broad enough in interest to appeal to luncheon clubs, technical photographic meetings, stockholder groups and even the Army itself. After Hycon made ten prints for its own use and delivered one to Radioplane, the Army Pictorial Service borrowed the original to make an unspecified number of copies to tell the story of close-in combat surveillance both in this country and abroad.

Professional Polish

To maintain a professional polish in the finished film, the original was cut on an A-B roll with formal fades and dissolves. Titles and credits were designed to double print over an establishing background. To cut costly art work, all titles were type-set and photographed on Kodalith film. Then the resulting white on black transparency was shot with a light behind the copy so that the finished letters printed white on a slightly underexposed moving background.

Any film utilizing military products or equipment must be cleared by the Security Review Branch, Department of Defense, Washington, D. C. After receiving a qualified approval from the colonel in charge of the Battle Area Surveillance Department at Fort Huachuca, Hycon forwarded the film and four copies

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of the script to Washington. Since a sound stripe was added to the completed work print, the review board was able to see a relatively complete production with narration timing roughly in sync with scenes on the screen. With the tentative narration already on the film, approval was received in just one showing. Any required changes were noted on the script and incorporated in the final professional narration.

Recording was done on Hollywood sound stages, Cinesound in this instance, and as much music was added as the budget allowed. William E. Welch, a former radio announcer and then a member of Hycon's Technical Writing Staff, handled the narration. Utilizing events that would happen regardless of the film, Hycon was able to complete a twenty-three and a half minute sound and color production for somewhat less than $4,000. This total includes over 5,000 feet of color original and a somewhat smaller amount of edge-numbered color work print since some original was eliminated before printing to keep costs down. Five hundred dollars was spent for recording time and music royalties, and a month's time for two men, transportation and per diem completed the total. □

GRAPHIC

continued from page 54

It was gratifying to me only recently when a supervisor from an electronic plant in San Diego called me in Buffalo to thank me for the two different articles I wrote about pin-point light source last year. He went on to state that they had tried pin-point light source and many of their problems were solved. This one phone call made me feel that my whole effort for 1957 had been worthwhile. I am always anxious to hear from any reader about a problem and, of course, extra anxious to hear from any reader who has been given a bit of help from material written in this column. □

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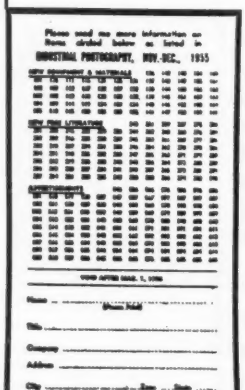

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5362 Cahuenga Blvd.
Hollywood, Calif.

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Kling Photo Corp.
257 Fourth Avenue
New York, N. Y.

300mm f/5.6 Kilfitt Tele-Kilar
Covers 2¼ x 2¼ film area

Pacific Optical Corporation
120 South Glasgow Avenue
Inglewood 1, California

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24" f/4.0 Paxar
Covers 9 x 9 film area

24" f/4.5 Paxar
Covers 9x18 film area

48" f/4.0 Paxar
Covers 9x9 film area

Paillard Products
100 Sixth Avenue
New York 13, N. Y.

250mm f/5.6 Zeiss Sonar F.5.6.C
Covers 120 film area

Sterling Howard Corp.
561 East Tremont Ave.
New York 57, N. Y.

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Covers 2¼ x 2¼ film area

500mm f/5.0 Astragon
Covers 2¼ x 2¼ film area

600mm f/5.0 Astragon
Covers 2¼ x 2¼ film area

800mm f/5.0 Astragon
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Unitron 3" Astronomical Objective, 1200mm, f/16

Unitron 2.4" Astronomical Objective, 900mm, f/15

Zenith Optical Division
Polan Industries, Inc.
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Huntington, W. Va.

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General Distributors

These companies have a wide selection of ultra-long lenses from various domestic and foreign manufacturers. In addition, custom design lenses and government surplus items are available. For complete catalog listings use the Readers Inquiry Card, page 73, circling number indicated below.

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Chicago 4, Ill.
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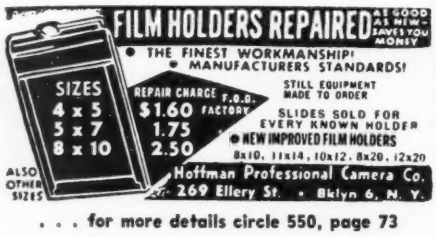
Gordon Enterprises
5362 Cahuenga Blvd.
Hollywood, Calif.
Circle Number 244



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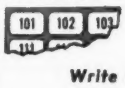

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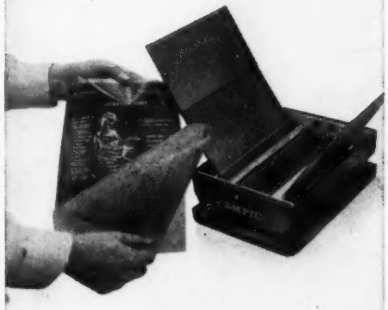

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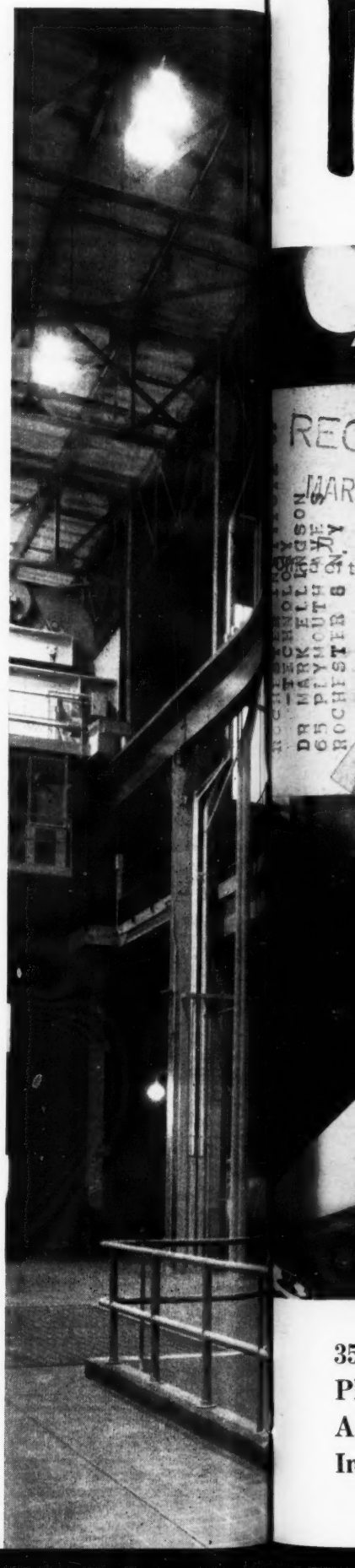

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Ansco

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